

**People with serious mental illness living in
supported accommodation:
a meta-analytic and secondary data
analysis study**

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People with serious mental illness living in supported accommodation: a meta-analytic and secondary data analysis study

People with serious mental illness experience significant difficulties related to social, occupational and cognitive functioning. A key form of intervention for these individuals is supported accommodation, with the aim of providing opportunities to live in the community, develop independence and increase social integration. Supported accommodation ranges from help being available 24 hours a day, to having support provided at home one to two times a week. There has been increasing interest in understanding if this type of intervention not only supports clinical outcomes – that is, symptoms and levels of risk – but also outcomes important to people's recovery, including wellbeing, satisfaction with life, living conditions and social functioning.

The aim of the research was to investigate supported accommodation for people with serious mental illness. The first objective was to consider outcomes for individuals, including quality of life issues such as wellbeing, satisfaction with living conditions and social functioning. The second objective was to understand what personal and environmental factors determined the placement of individuals in different types of supported accommodation.

This study followed two stages. First, a systematic review and meta-analysis of outcomes for people with serious mental illness living in three types of supported accommodation was conducted to address the first research objective. This identified that outcomes related to wellbeing, satisfaction with living conditions and social functioning improved for people as they moved into accommodation with less support. The second stage used secondary data analysis of two national datasets: the Scottish Morbidity Record – Scottish Mental Health and Inpatient Day Case Section (SMR04); and the Scottish Government Social Care Survey (SGSCS). This phase primarily addressed the second research objective. Logistic regression modelling identified the contextual factors that predict being placed in supported housing and floating outreach accommodation from high support accommodation. For placement in supported housing compared to high support accommodation, predictors were age, a diagnosis of schizophrenia, length of stay and a formal admission to hospital. For placement in floating outreach compared to high support, formal admission to hospital was a predictor. There was limited data available which would address outcomes associated with different placement types. However, predictors of people's needs were identified. A diagnosis of schizophrenia predicted having a healthcare need; length of stay predicted having a social, educational and recreational need; and individuals were more likely to have needs identified if support was provided by the local authority.

The results suggested that people with serious mental illness achieved greater wellbeing, satisfaction with living conditions and social functioning in less restrictive accommodation. Predictors of accommodation placement were prolonged involvement with mental health services, a diagnosis of schizophrenia and extended lengths of stay in high support. Irrespective of placement type, social, educational, recreational and healthcare needs are important for this client group. The study highlights that service user perspectives on outcomes in mental health services are not routinely identified in national datasets. For future research, it is recommended that personal and environmental factors are explored within supported accommodation environments to understand how these affect the recovery of people with serious mental illness, and to assess outcomes associated with different supported accommodation types.

DEFINITION OF TERMS

Term or acronym	Definition
Administrative Data Research Centre	The Administrative Data Research Centre for Scotland was led by the University of Edinburgh between 2013 and 2018; and brought together major Scottish research centres. The Centre involved world leading experts in the theory, methods and policy of linking records for secondary uses, including linking and analysing large datasets.
CHI	The Community Health Index (CHI) is a population register used in Scotland for health care purposes. The CHI number uniquely identifies a person on the index.
Commissioning	In health and social care, this term describes the entire process of assessing, planning, specifying, securing and monitoring services to meet people's needs at a strategic level.
Compulsory Treatment Order (CTO)	A CTO allows for a person to be treated for their mental illness in hospital or the community, setting out a number of conditions which the person has to comply with. These can include having to stay in a particular place in the community, having to allow visits in their home by people involved in their care and treatment and having to attend for medical treatment as instructed.
eDRIS	Electronic Data Research and Innovation Service. This service provides a single point of contact to assist in the completion of applications to the Public Benefit and Privacy Panel; and assist researchers in study design, approvals and data access in a secure environment.
Environmental factors	Factors within the supported accommodation environment that can have an impact on people with serious mental illness living there. These include physical, social and attitudinal factors.
EPCC	Edinburgh Parallel Computing Centre. In relation to this study, the EPCC host and are the trusted linkage agent for the National Safe Haven: authorised by the NHS to connect de-identified sensitive datasets together for research.
EPHPP	Effective Public Health Practice Placement Quality Assessment Tool for Quantitative Studies.
Farr Institute	The Farr Institute was a UK-wide research collaboration involving 21 academic institutions and health partners in England, Scotland and Wales. Publicly funded by a consortium of ten organizations led by the Medical Research Council between 2013 and 2018, the Institute was committed to delivering high quality, cutting-edge research,

	using 'big data' to advance the health and care of patients and the public. The Farr Institute did not own or control data but analysed it to better understand the health of patients and populations.
Floating outreach	A type of supported accommodation. Floating outreach services provide support to people with serious mental illness living in their own self-contained tenancy, who are visited several times a week by support workers. Levels of support will reduce as the individual becomes more able to look after themselves and their home.
Health Boards	NHS Health Boards in Scotland are responsible for the protection and improvement of their population's health and for the delivery of frontline healthcare services in the board area.
Health and Social Care integration	The Public Bodies (Joint Working) (Scotland) Act 2014 set out the legislative framework for integrating adult health and social care in Scotland. As a result, Health Boards and Local Authorities have established integration authorities: with integrated partnership arrangements between NHS Health Boards and Local Authorities, including an integrated budget, locality planning and a strategic commissioning plan.
High Support	A type of supported accommodation. High support accommodation is provided in hospital or the community with 24-hour staffing on site. Meals, other daily living activities and supervision of medication are provided for people with serious mental illness.
HoNOS	Health of the Nation Outcome Scale.
Integration authorities	In Scotland, Integration Authorities have responsibility for planning, resourcing and co-ordinating community-based health and social care services.
ISD	The Information Services Division is part of NHS National Services Scotland. It provides health information, health intelligence, statistical services and advice that support the NHS in progressing quality improvement in health and care and facilitates robust planning and decision-making.
Lancashire QoLP	Lancashire Quality of Life Profile (Oliver et al. 1997). A quality of life measure designed for people with serious mental illness.
Legal status at admission	For this study, this indicates whether the person was detained in hospital at admission under the Mental Health (Care and Treatment) Scotland Act 2003 (formal); or if they were admitted informally (not detained).
Length of stay	The number of days that elapse between admission date and discharge date from hospital.

Local Authority	In the UK, a local authority is an organisation officially responsible for all the public services and facilities in a particular area. These responsibilities include services related to housing, education and social care. There are 32 local authority areas in Scotland.
MANSA	Manchester Short Assessment of Quality of Life (Priebe et al. 1999). A quality of life measure designed for people with serious mental illness.
Mood disorders	ICD10 diagnostic category that include depression, bipolar affective disorder and manic episodes.
National Safe Haven	The National Safe Haven in Scotland is managed by the EPCC. A Safe Haven, in terms of NHS data, is a secure environment supported by trained staff and agreed processes, whereby health data can be processed and linked with other health data (and/or non-health-related data) and made available in a de-identified form for analysis to facilitate research. It is a safeguard for confidential information being used for research purposes.
Needs	The identified client care needs which will be met by the self-directed support Care Package. These are personal care needs; domestic care needs; healthcare needs; social, educational and recreational needs.
NHS	The National Health Service is the publicly funded national healthcare system in the United Kingdom, free at the point of use for all UK residents to ensure good healthcare for all. Responsibility for healthcare is devolved from the UK government to the Scottish government.
NHSScotland	NHSScotland is the National Health Service delivered in Scotland. It consists of 14 regional NHS Boards, seven Special NHS Boards and one public health body, which support regional NHS Boards by providing a range of specialist and national services.
NRS	National Records of Scotland is a non-ministerial department of the Scottish government. Their purpose is to collect, preserve and produce information about Scotland's people and history and make it available to inform current and future generations.
NRS Indexing team	National Records of Scotland Indexing team is part of the Scottish Informatics and Linkage Collaboration (SILC).
NSS	NHS National Services Scotland is a national NHS Board providing support and advice to enable services to be delivered more efficiently and effectively. Relative to this study, their role includes compiling and using the potential of Scotland's national health and care datasets.

Objective QoL	Objective QoL encompasses the external life circumstances which a person encounters in everyday life and consist of satisfaction with living conditions and satisfaction with social functioning.
PBPP	The Public Benefit and Privacy Panel is a governance structure of NHSScotland, exercising delegated decision-making on behalf of NHSScotland Chief Executive Officers and the Registrar General. The Panel operates as a centre of excellence for privacy, confidentiality and information governance expertise in relation to Health and Social Care in Scotland.
Personality Disorders	ICD10 diagnostic category that includes disorders of adult personality and behaviour.
Personal factors	Factors that identify individual characteristics of the person including age, gender, diagnosis and ethnicity which may affect what type of supported accommodation the person lives in.
PIA	Privacy Impact Assessment.
Previous Psychiatric Care	Indicates whether the person has been admitted to psychiatric hospital before or if this is their first admission.
QoL	Quality of life.
QoLI	Quality of Life Interview (Lehman 1988). A quality of life measure designed for people with serious mental illness.
RTI item bank	Research Triangle Institute Item bank tool. Used for evaluating the risk of bias and precision of observational studies.
Schizophrenia	ICD 10 diagnostic category that includes schizophrenia, schizotypal disorders, delusional disorders and schizoaffective disorders.
Self-directed support (SDS)	Self-directed support is a way to ensure that people who are eligible for support are given the choice and control over how their individual support budget is arranged and delivered to meet their agreed health and social care outcomes.
Serious mental illness	A person has a serious mental illness if they have a diagnosis of psychosis which they have experienced for over two years; and significant disabilities which affect self-care, social, occupational and cognitive functioning.
SGSCS	Scottish Government Social Care Survey.
SILC	Scottish Informatics and Linkage Collaboration. This is a Scotland-wide collaboration between NHS National Services

	Scotland (NSS), academic partners in the Farr Institute, the Administrative Data Research Centre and National Records of Scotland, developed following consultation in 2012 on the aims, benefits and challenges to data linking.
SIMD	Scottish Index of Multiple Deprivation (SIMD). The index is based on a large number of indicators in several domains: combined into an overall index by the Scottish government (SG) to identify area concentrations of multiple deprivation.
SMR04	Scottish Morbidity Record – Scottish Mental Health and Inpatient Day Case Section.
Subjective QoL	Subjective QoL encompasses a person's satisfaction with life and their sense of wellbeing.
Supported housing	A type of supported accommodation. Supported housing is provided as tenancies in shared living with staff based on site for up to 24 hours a day. The focus is on rehabilitation, with people with serious mental illness being supported in gaining independent living skills.
Support mechanism	Indicates who the person with serious mental illness purchases care and support to meet their needs from, or has care and support provided by. This can include local authorities, private providers, and third sector organisations.
Support staff	Staff who are paid to provide support to people with serious mental illness in developing daily living skills and participation in social and leisure activities. Support staff can be employed by a local authority or third sector organisations commissioned by the local authority to provide this support.
Third sector organisations	Third sector organisations are 'not for profit' organisations which are not government controlled. They sit between public services and the private sector. In Scotland, third sector organisations include community groups, voluntary organisations, charities, social enterprises and co-operatives. In this study, third sector organisations refer to services commissioned by local authorities from third sector organisations to provide direct care and support to people with serious mental illness.
WHO	World Health Organisation.

1 Introduction

The introduction will describe the personal motivations for this professional doctorate, followed by an overview of the thesis.

1.1 Personal motivations for the professional doctorate study

I have been an occupational therapist for 28 years. I worked in the National Health Service (NHS) for 20 years, holding clinical and leadership roles in mental and physical health settings. This involved working with people with a range of complex needs. Over time, I became frustrated with the management and support provided for people with serious mental illness in health and social care systems. I wanted to be able to explore this further and decided to move from full-time clinical work to full-time academic work.

When faced with my doctoral topic choice, I was particularly interested in the needs of people with serious mental illness and supported accommodation environments. I was keen to understand what the outcomes of supported accommodation were, and how and why people accessed it. I was also aware of a lack of consistent intervention being delivered by mental health services and support providers for people living in supported accommodation to enable important outcomes for individuals, including daily life participation and quality of life (QoL; Kyle and Dunn 2008; Kirsh et al. 2009). I was particularly interested in people with serious mental illness, who are often failed in terms of intervention due to the complexity of their needs and have limited life opportunities, with professionals often having a reduced sense of hopefulness about their potential (Ross and Goldner 2009; Killaspy et al. 2015).

During my academic career, I was involved in assessing supported accommodation services (Fisher et al. 2014). Interviews with service users showed high levels of variability in the way environments were experienced by service users, and how effective these were in supporting their needs and goals. In particular, they identified how impactful their living environment was on their daily lives, and their opportunities to participate in meaningful activities. Service users highlighted how system level issues – for example, how packages of care to support them are commissioned – created inflexibility in how they managed their daily routine, or when they had the opportunity to express how they wanted to structure their days. While service users

frequently reported good relationships with the staff who supported them with daily living and other activities, the support received did not consistently enable effective participation in activities they needed or wanted to do, resulting in frustration. A balance of private and communal space was also a key issue, while access to equipment to support daily living activities was also highlighted (Unpublished report, Harrison et al. 2014).

A pivotal moment was when a new service was established which utilised knowledge about physical and social environments. The service was delivered by a multi-agency staff team consisting of psychiatric nurses, an occupational therapist, support workers who provide support with daily living skills, and a volunteer coordinator who works with people to increase opportunities for volunteering and peer support workers. The team was focused on meeting people's identified needs, supporting them to participate in meaningful community activities and develop living skills. What was striking here was the impact of opportunities to personalise space: with the personalisation of people's bedrooms providing the opportunity to exercise choice over decor and objects meaningful to the individual.

“Residents talked positively about their personalised rooms, as well as a new-found sense of independence and freedom. A resident talked about how much they liked having their own fridge in their room and how pleased they were to be able to paint it Hibs green”
(Unpublished report, Wayfinder Partnership 2017, p5).

Moving into a different environment also had a considerable impact on how people settled into the service and engaged with the staff to meet their rehabilitation goals.

“Residents told us they liked cooking their own food, playing football, going to the betting shop, listening to Leonard Cohen and especially, visiting family and rebuilding these relationships”
(Unpublished report, Wayfinder Partnership 2017, p4).

One resident talked about the importance of having the keys to her room and this being her own private space - and the opportunity this facilitated to meet with her children and organise normal family routines, like having meals together and being able to talk with family in a private space.

“I’m not living by lock and key now either; I’ve got my own lock and key which I carry round my round my neck 24/7 so it can remind to never go back to where I was in hospital locked ward” (Esther, Royal Edinburgh Hospital Patients Council 2017, p68).

This was a particularly inspiring narrative for me, as it showed there was a change in how people experienced their living space, their sense of freedom and the relationships they had built with staff after being in hospital wards for several years.

These events led me onto a path of academic investigation into how supported accommodation environments which provide a place to live with support from staff up to 24 hours a day (Priebe et al. 2009) enable people with serious mental illness to create opportunities to participate in a meaningful life. This became my academic passion. An initial review of the literature in this area indicated that although supported accommodation is provided internationally, there is no consistent way of describing or delivering these services (Newman 2001; Tabol et al. 2010). It also showed that once people are in supported accommodation, they often make initial improvements to their level of participation and development of living skills: but this plateaus between two and five years (McInerney et al. 2010), showing that continued potential is not considered and people are maintained rather than being supported towards meeting their life goals. This inspired me to complete a professional doctorate to determine if outcomes that support recovery for people with serious mental illness vary across different types of supported accommodation; and what factors influence the type of supported accommodation individuals are placed in.

An overview of this dissertation will now be presented.

2 Dissertation summary

Mental health is a significant international health challenge (World Health Organisation (WHO), 2010). It is estimated that worldwide, 300 million people have been diagnosed with depression, 60 million people with bipolar disorder, and 23 million diagnosed with schizophrenia (WHO 2017). There is a 0.5% prevalence rate of psychosis (those with a diagnosis of schizophrenia, psychosis or major affective disorder) in the UK population (Bebbington et al. 2014; Mental Health Foundation (MHF), 2016), equivalent to 1-2 adults per 1000 people. 5-10% of people diagnosed with psychosis are considered to have a serious mental illness due to having experienced psychosis for over 2 years and significant disabilities which affect self-care, social, occupational and cognitive functioning (National Institute of Mental Health 1997; Cook and Chambers 2009; Clifton et al. 2013). Although people with serious mental illness account for 10% of mental health service users, spending is proportionally higher to support the health and social care needs of this population (Killaspy et al. 2015).

People with serious mental illness often experience a denial of their economic, social and cultural rights (WHO 2011). This leads to discrimination, resulting in significant consequences for society and the individual (Rogers and Pilgrim 2003; WHO 2013). Global consequences include poverty, homelessness and incarceration (WHO 2008; Le Boutillier et al. 2015). This results in increased costs for society in terms of government benefits, unemployment, loss of revenue (tax), loss of skills to the workforce, poor health, increased social care, increased institutionalisation costs, service provision costs, care burden, disintegration of family units/informal care networks, and pharmacological costs (Mansell et al. 2007; Scull 2011; Pilgrim 2012; Docherty and Thornicroft 2015).

A significant number of people with serious mental illness live in supported accommodation (Killaspy et al. 2016a). Supported accommodation environments aim to provide opportunities to live in the community, develop independence and increase social integration (Priebe et al. 2009). There has been increasing interest in understanding if this type of intervention not only supports clinical outcomes – that is, symptoms and levels of risk – but also outcomes important to people's recovery, including wellbeing, satisfaction with living conditions and social functioning (Fakhoury and Priebe 2002; Piat et al. 2008). There is also interest in what personal and environmental factors determine the type of supported accommodation

individuals are placed in, as a means of ensuring delivery of recovery focused services (Slade et al. 2014; Petersen et al. 2015; Piat et al. 2015).

The aim of the research was therefore to investigate supported accommodation for people with serious mental illness. The first objective was to consider outcomes for individuals in different accommodation types. The second objective was to understand what personal and environmental factors determined the placement of individuals in different types of supported accommodation.

The research questions for the study were:

Research Question 1: Are there differences in quality of life outcomes for people with serious mental illness living in high support, supported housing and floating outreach-supported accommodation?

Research Question 2: What personal and environmental factors predict moving from high support to supported housing and floating outreach-supported accommodation for people with serious mental illness?

2.1 Systematic review and meta-analysis summary

Research Question 1 was addressed by conducting a systematic review and meta-analysis of outcomes related to three domains of quality of life (QoL) – wellbeing, satisfaction with social functioning and satisfaction with living conditions – for people with serious mental illness living in three types of supported accommodation – high support, supported housing and floating outreach. No synthesis of other outcomes was possible in the meta-analysis; only these outcomes are presented. A search was conducted in six electronic databases. A random-effects model was used to derive the meta-analytical results. Thirteen studies from seven countries were included, involving 3276 participants receiving: high support (457), supported housing (1576) and floating outreach (1243). QoL outcomes related to wellbeing, satisfaction with living conditions and satisfaction with social functioning were compared between different supported accommodation types. The main results were:

1. High support accommodation was associated with the least favourable quality of life overall. Results for sub-domains satisfaction with living conditions ($g = -0.31$; $CI = [-0.47; -0.16]$) and satisfaction with social functioning ($g = -0.37$; $CI = [-0.65; -0.09]$) indicated that outcomes were better for people living in supported housing compared to high support accommodation.

2. Wellbeing outcomes ($g = -0.95$; $CI = [-1.30; -0.61]$) were better for people in floating outreach compared to high support accommodation.
3. There were no significant differences between peoples' satisfaction with living conditions ($g = -0.07$; $CI = [-0.88; 0.73]$) and social functioning ($g = -0.40$; $CI = [-0.93; 0.13]$) between high support and floating outreach.

The meta-analysis suggests that the different types of supported accommodation affect the QoL of people with serious mental illness across three domains: wellbeing, satisfaction with living conditions and satisfaction with social functioning.

2.2 Secondary data analysis summary

Research Question 2 was addressed by completing secondary data analysis on two national datasets. The Scottish Morbidity Record – Scottish Mental Health and Inpatient Day Case Section (SMR04) and the Scottish Government Social Care Survey (SGSCS) were selected as they included relevant personal and environmental factors (see definitions of terms). A single anonymised data extract was generated from the two datasets for 2013/14, 2014/15 and 2015/16 by the National Record Scotland (NRS) indexing team. Analysis was performed using R (version 3.5).

Multinomial regression was used to determine which personal and environmental factors predicted moving from high support, to supported housing and to floating outreach accommodation for people with serious mental illness.

The datasets were reviewed to ascertain if an analysis could be completed to explore QoL outcomes in a bid to further address Research Question 1. The datasets did not report QoL outcomes; but items were available on Personal Care; Domestic Care; Healthcare; Social, Educational and Recreational Needs. A supplementary research question was developed and analysis was completed to determine what personal and environmental factors predicted Personal Care; Domestic Care; Healthcare; Social, Educational and Recreational Needs of people with serious mental illness in supported accommodation.

The sample size for the multinomial regression was 3432 (High Support n=274; Supported Housing n=301; Floating Outreach n=2857). Significant predictors of a move to supported housing for people with serious mental illness were:

- Age;
- Having a diagnosis of schizophrenia;
- Length of stay;
- Having a formal admission to hospital.

For discharge to floating outreach, formal admission to hospital was the only significant predictor.

The sample size for the logistic regressions for identified needs was:

- Personal Care need n=198;
- Domestic Care need n=217;
- Healthcare need n=201;
- Social, Educational and Recreational need n=211.

Significant predictors of needs were:

- People with a diagnosis of schizophrenia were 313% times more likely to have a healthcare need identified than people with a mood disorder.
- Length of stay predicted a social, educational or recreational need being identified.
- Being supported by the local authority was a significant predictor for all identified needs (Personal Care, Domestic Care, Healthcare, Social, Educational and Recreational).

3 Literature Review

The foundation of this chapter is based on peer reviewed literature. It will first introduce the key background concepts for people with serious mental illness, then go on to identify a critical gap in the current literature, which this dissertation has investigated. The chapter is separated into two sections. Literature review – Background provides an introduction to key concepts of the dissertation, including describing people with serious mental illness, defining supported accommodation, the Scottish government policy context, defining quality of life, how to measure quality of life for people with serious mental illness, deinstitutionalisation and quality of life. This background literature will provide the basis for more formal scrutiny.

The second section will present a systematic literature review and accompanying meta-analysis which will identify the critical gap in the literature surrounding people with serious mental illness, which ultimately forms the remaining dissertation research questions. First, the background literature will be presented.

3.1 Literature Review - Background

3.2 Serious Mental Illness

Mental health is a significant international health challenge (WHO 2010). It is estimated that worldwide, 300 million people have been diagnosed with depression, 60 million people with bipolar disorder, and 23 million people with schizophrenia (WHO 2017). There is a 0.5% prevalence rate of psychosis (those with a diagnosis of schizophrenia, psychosis or major affective disorder) in the UK population (Bebbington et al. 2014; Mental Health Foundation (MHF), 2016), equivalent to 1-2 adults per 1000 people. 5-10% of people diagnosed with psychosis are considered to have a serious mental illness due to having experienced psychosis for over 2 years and having significant disabilities which affect self-care, social, occupational and cognitive functioning (National Institute of Mental Health 1987; Cook and Chambers 2009; Clifton et al. 2013). In Scotland, this would constitute approximately 27,500 people with a psychosis diagnosis, with approximately 2,750 considered as having a serious mental illness.

Although people with serious mental illness account for 10% of mental health service users, spending is proportionally higher to support the health and social care needs of this population (Killaspy et al. 2015). As a result, people with serious mental illness

often experience a denial of their economic, social and cultural rights (WHO 2011). This can lead to discrimination, resulting in significant consequences for society and the individual (Rogers and Pilgrim 2003; WHO 2013). Global consequences include poverty, homelessness and incarceration (WHO 2008; Le Boutillier et al. 2015). This results in increased costs for society in terms of government benefits, unemployment, loss of revenue (tax), loss of skills to the workforce, poor health, increased social care, increased institutionalisation costs, service provision costs, care burden, the disintegration of family units/informal care networks, and pharmacological costs (Mansell et al. 2007; Scull 2011; Pilgrim 2012; Docherty and Thornicroft 2015).

Consequences for individuals with serious mental illness considered to have complex needs include violations of human rights (WHO 2011): resulting in marginalisation, isolation and disconnection from others, including family and friends (Borg and Kristiansen 2004, Chesters et al. 2005, Killaspy et al. 2014; Stadnyk et al. 2013). Poverty of expectation can lead to poor personal identity and competency because the person limits their own engagement in meaningful everyday activity in society, limiting their opportunities (Krupa et al. 2003; Leufstadius et al. 2006; Minato & Zemke, 2004, Shimitras et al. 2003; Prior et al. 2013). This can mean not having a life similar to that of their peers, feeling unable to look after themselves, and a lack of roles, all of which have a significant negative impact (Bejerholm & Eklund 2007; Crist et al. 2000). Being hopeless, having a lack of choice, and lack of self-belief (Bengtsen-Tops et al. 2014; Petersen et al. 2015) results in higher suicide risk (Healy et al. 2006; Hor and Taylor 2010) and reduced life expectancy (Piatt et al. 2010). Therefore, people with serious mental illness are less likely to experience a good quality of life.

3.2.1 Supported Accommodation

The literature overall illustrates that while 20 years ago, many people with multiple and complex needs were accommodated and cared for in institutional settings, policy movements have promoted more diverse, community-centred systems of provision; one consequence of this is the multiplication of services and professionals involved in people's lives (Gallimore et al. 2008; 2009). The stigma attached to being within service structures can result in individuals being excluded by or excluding themselves from society. Rankin and Regan (2004) suggest that services themselves are to blame for stigmatising people with multiple and complex needs; an individual's

problems may not be recognised because they have a breadth of issues (multiple needs) (Gallimore et al. 2008; 2009).

A significant number of service users with serious mental illness participate in their daily activities within environments constructed due to deinstitutionalisation (Killaspy 2016 (a)). This is commonly called supported accommodation (Priebe et al. 2009), and consists of:

- a) High support accommodation provided in hospital or the community with 24-hour staffing on site. Meals, other daily living activities and supervision of medication are provided for people with serious mental illness.
- b) Supported housing is provided as tenancies in shared living with staff based on site for up to 24 hours a day. The focus is on rehabilitation, with people with serious mental illness supported to gain independent living skills.
- c) Floating outreach services provide support to people with serious mental illness living in their own self-contained tenancy, who are visited several times a week by support workers.

Levels of support will reduce as the individual becomes more able to look after themselves and their home (Priebe et al. 2009; Killaspy et al. 2016(a)). The societal assumption is that supported accommodation will facilitate people to increase their quality of life; however, the literature has not explained how supported accommodation environments do this (Mansell 2006, Taylor et al. 2009, Stainton et al. 2011; Killaspy et al. 2011). From a service user perspective, this can be achieved by choosing where to live, who they live with (whether in shared supported accommodation or individual supported accommodation) (Piat et al. 2008), who supports them, and how they are supported to achieve individual goals (Padgett 2007; Bredski et al. 2015).

The ability to have a choice about these things is affected by how health and social care services assess, plan, specify, secure and monitor supported accommodation services to meet people with serious mental illness needs (Young 2015), and the reporting mechanisms specified to detail outcomes (Harrison et al. 2004; Buck et al. 2016). It has been argued, however, that supported accommodation environments have become institutions within the community (Leff and Trieman 2000; Priebe et al. 2008). There are limitations within these environments: each type of supported accommodation has a different intervention focus, meaning there are different expected outcomes for people with serious mental illness. For example, while

supported housing and floating outreach services enable or support independent living skills, people with serious mental illness in high support accommodation for 1-3 years (Joint Commissioning Panel for Mental Health 2016) frequently have daily living activities completed for them and may have restricted opportunities to access leisure, social, education and work activities, due to the location of these types of accommodation. The issue of structuring supported accommodation to facilitate people with serious mental illness to integrate back into society has not been systematically explored, although this might in part be due to the lack of consistent service models and poor outcome data (Newman 2001; Leff et al. 2009; Tabol et al. 2010).

It is therefore important to develop a better understanding of how supported accommodation environments enable or restrict people from experiencing quality of life outcomes related to wellbeing, satisfaction with living conditions and social functioning.

3.2.2 Scottish Government Policy Context

Legislation that underpins the current arrangements for the National Health Service (NHS) in Scotland already includes parity of approach in relation to mental and physical health. It also places a duty on local authorities to provide services for those who have or have had a mental health problem, to promote their wellbeing and social development, minimise the effect of mental disorder and give people the opportunity to lead lives as normal as possible (Scottish Government 2017a). Since April 2016, there has also been a key role for integration authorities: who have responsibility for planning, resourcing and co-ordinating community-based health and social care services in Scotland, relating to local health and social care services, and including hospital and community mental health services (NHS Health Scotland, 2016). Scotland's commitment to meeting the needs of those who require access to mental health services reflects the importance which the government attaches to realising the right of every individual to the highest attainable standard of physical and mental health. The government's policy statements contribute to the progressive realisation of internationally recognised rights (WHO 2013), and directly support the shared vision of a socially inclusive and successful Scotland: where every member of society is able to live with human dignity (Scottish Government 2016).

The Scottish context also recognises that inequality related to disabilities, age, sex, gender, sexual orientation, ethnicity and background can all affect mental wellbeing and the incidence of mental illness. Some groups are more likely than others to experience mental ill health and poorer mental wellbeing: for example, those who have experienced trauma or adverse childhood events; with substance use problems; are experiencing homelessness, loneliness or social isolation; veterans, refugees and asylum seekers (Fell & Hewstone 2015).

The Scottish government's ambition is for a sustainable health and social care system which helps to build resilient communities (Academy of Medical Royal Colleges 2009). A strategic shift towards recovery models focused on assets, strengths and self-management is advocated as a way to enable service transformation and promote citizenship (Slade et al. 2014; Rowe and Pelletier 2012; Petersen et al. 2015). This is fundamental not only to how mental health services are designed and provided, but to the design and provision of all services with the potential to improve mental health and wellbeing (Scottish Government 2017(a)). This goes substantially beyond the scope of health services. The Scottish government emphasises that the importance of the approach and culture of staff in public services, including mental health services and other health and social care services, in working with people with mental health problems, cannot be overstated (Scottish Government 2017(a)).

3.2.3 Defining Quality of Life

Quality of life (QoL) is a widely adopted concept signifying an individual's satisfaction with their life (Fakhoury and Priebe 2002). It has been increasingly used to measure the outcome of interventions from healthcare services (Piatt et al. 2010). Increased life satisfaction while managing long term illness and/or disability, is considered as important as treatment and cure (Ruggeri et al. 2002). This acknowledges that the outcome of healthcare treatment and interventions is affected by individual factors and wider life circumstances. An individual's experience or attainment of happiness or satisfaction with life is often considered the basis of quality of life (Dijkers 1999; Bowling 2005).

Satisfaction with life can be considered to reflect people's aspirations and measure the extent of their adaptation to their current life conditions rather than the conditions themselves. Wellbeing and subjective QoL are closely linked; for the purpose of this study, the term 'life satisfaction and wellbeing' will be used to describe subjective QoL

as it encompasses both the idea of general happiness with life and people's sense that they have the life they want (Salvador-Carulla et al. 2014). Wellbeing therefore constitutes how the person feels about their lives (Camfield and Skevington 2008). Sociological and psychological conceptualisations build on this by considering the factors which create a sense of wellbeing and life satisfaction for people with serious mental illness. Key factors identified are autonomy and control, self-sufficiency, internal control, and the capacity to develop skills to be independent, fulfil life goals, and build and sustain social relationships (Connell et al. 2012).

External life conditions can influence an individual's satisfaction with their current life situation (Hansson 2006). These are the factors which the person encounters in everyday life which are important in meeting their needs; and relate to satisfaction with living conditions and social functioning. Satisfaction with living conditions includes satisfaction with living situations, being in employment or education, and being satisfied with income/finances, or general safety (Barry and Zissi 1997). Satisfaction with social functioning includes satisfaction with relationships with family and others, health (physical and mental), leisure and social activities (Barry and Zissi 1997). In this study, satisfaction with living conditions and satisfaction with social functioning will be considered as objective QoL outcomes.

There are several challenges reported in the literature regarding how QoL is defined. Bowling (2005) states that no definitive theoretical framework of QoL has been agreed. This lack of conceptual clarity leads to a multiplicity of concepts being considered as reflecting quality of life, dependent on the theoretical perspective employed. Connell et al. (2014) argue that quality of life is defined by professionals, academics and policymakers, and therefore reflects the priorities of these influential groups and the outcomes they consider important. They propose that individually defined quality of life has most value, as it reflects unique personal circumstances and experience (Connell et al. 2014). While differing conceptual perspectives of QoL are utilised, it cannot be considered in isolation from life circumstances and the opportunities available to people. QoL is therefore affected by personal, cultural and value systems, and the environment that people live in (WHO 1995).

3.2.4 Measuring QoL for People with Serious Mental Illness Needs

The measurement of QoL relies on conceptual clarity about what is being measured, Within mental health literature, studies have argued that negative symptomology,

decreased life chances, co-morbidity (depression, anxiety and substance use), stigma and the ability to make decisions or have choices all affect quality of life for people with serious mental illness (Connell et al. 2012). Measuring the QoL of people with serious mental illness is important in understanding outcomes of interventions. QoL measures have been developed specifically for people with serious mental illness, focused on satisfaction with subjective and objective QoL issues seen as pertinent to this population.

Lehman's Quality of Life Interview (QOLI) (1988) was one of the earliest measures developed. Further QoL measures were developed based on this, including the Lancashire Quality of Life (LQoLP; Oliver et al. 1997), and Manchester Short Assessment of Quality of Life (MANSA) (Priebe et al. 1999). The LQoLP and the MANSA both retained measurement of satisfaction with both subjective and objective QoL, while synthesising the number of items from Lehman's QOLI to make the measures easier to administer while still retaining good psychometric properties (Priebe et al. 1999). Combining a person's subjective rating of their satisfaction with life and wellbeing and rating of objective life circumstances within QoL measurement has been argued as providing a more robust understanding of an individual's QoL (Oliver et al. 1997); and is potentially a way to capture the inter-relationship of an individual's experience of their life and its interaction with current life circumstances.

This background literature section will now examine issues related to deinstitutionalisation for people with serious mental illness.

3.2.5 Deinstitutionalisation and Quality of Life

Measurement of QoL has become more prevalent as an increasing number of services are provided in the community for people with serious mental illness (Fakhoury and Priebe 2002). Deinstitutionalisation, the shift of care from hospital to the community, resulted in a range of supported accommodation being developed. The aim was to provide opportunities for people with serious mental illness to live in the community, develop independent living skills and increase opportunities for social integration (Priebe et al. 2009; Killaspy 2016(a)). QoL outcome measures were therefore developed to enable service user perspectives of the effectiveness of mental health services, including supported accommodation, to support engaging in a productive life and move beyond measuring recovery as only the absence of symptoms (Lehman 1988; Oliver et al. 1997; Priebe et al. 1999).

The strength of some of these measures has been advocated in terms of viewing the success of mental health and supported accommodation services based on service user perspectives only. However, a review of service user satisfaction ratings shows there is often a disparity, due to people with serious mental illness generally having lower life expectations than the general public (Priebe 2007).

Deinstitutionalisation has been implemented internationally, with the intention of challenging the stigma and restrictions placed upon people with serious mental illness (Novella 2010; Davidson and Arrigo 2013; WHO 2013; Salisbury et al. 2016; Shen et al. 2017). The initial belief was that this approach would save society money (Mansell et al. 2007; Knapp et al. 2011) and enable people to live within the wider community, thereby exposing them to normal roles and routines (normalisation; Wolfensberger, 2000; Aubry et al. 2013). It was also thought that there would be additional societal benefits, including increasing informal care networks and a reduction in the need for social care (Rogers and Pilgrim 2014; Hudson 2016). There was an assumption that people with serious mental illness could transfer from institutional care to the community and become fully functioning members of society, so there was no structured intervention to support this transition (McInerney et al. 2010).

Contemporary critiques of deinstitutionalisation argue that people experienced challenges to becoming fully functioning members of society, which resulted in a population of new longer-stay patients and re-institutionalisation (Priebe et al. 2005; Kunitoh 2013). It is proposed here that deinstitutionalisation was a failed attempt by society to manage discrimination and subsequent economic and cultural challenges (Pilgrim 2012; Pescosolido 2013).

Deinstitutionalisation has not been as effective as anticipated in improving QoL outcomes for people with serious mental illness (Thornicroft and Tansella 2013). The mental health service user movement's aspiration for all service users to be supported to participate in a productive life is still very much present in society (Slade et al. 2014). It has been argued that being a participant in a productive life is compatible with tackling discrimination and reducing the burden on society (Pescosolido 2015). If a person with serious mental illness engages in a life that supports them to take on roles and responsibilities in society as a worker, parent, spouse or friend (Brown and Kandirikira 2007) within a structured routine (Merryman and Riegel 2007), this gives them a sense of control (Wood et al. 2010) and belonging – with the outcome for society likely to involve a reduction in support care costs (Knapp et al. 2011).

3.3 Systematic Literature Review and Meta-Analysis

3.3.1 Context

People with serious mental illness routinely live in supported accommodation, where the aim is to facilitate increased participation in meaningful daily activities (Killaspy et al. 2016 (b)). However, there has been no clear articulation of how supported accommodation achieves this with individuals. This was the initial starting point of the inquiry; yet participation is not a well-used concept when examining the supported accommodation literature. The concept of QoL, on the other hand, is widely expanded upon, with a significant body of literature focusing on QoL concepts and outcomes for individuals in different supported accommodation types (Aubry and Myner 1996; Seilheimer and Doyal 1996; Pinikihana et al. 2002; Freeman et al. 2004; Bengtsson-Tops et al. 2005; Evans et al. 2007; Hansson and Björkman 2007; Kyle and Dunn 2008; Leff et al. 2009; Matejkowski et al. 2013; Henwood et al. 2014; Marcheschi et al. 2015; Emmerink and Roeg 2016; Sánchez et al. 2016; Welch and Cleak 2018).

QoL outcomes considered in the literature incorporate both subjective and objective QoL outcomes. Subjective QoL encompasses a person's satisfaction with life and their sense of wellbeing. QoL can be considered as an individual's experience or attainment of happiness or pleasure (Dijkers 1999; Bowling 2005). Life satisfaction is defined as a person's general happiness with life and the sense that they have the life they want and deserve (Salvador-Carulla et al. 2014); while wellbeing defines how the person feels about their lives and the actions associated with giving meaning to their life (Camfield and Skevington 2008). Objective QoL outcomes consider the external life circumstances which the person encounters in everyday life and consist of satisfaction with living conditions: which includes satisfaction with their living situation, being in employment or education, income/finances, general safety; and satisfaction with social functioning, which includes satisfaction with relationships with family and others, health (physical and mental), leisure and social activities (Barry and Zissi 1997).

The aim of this systematic review was to investigate adults (age 18-65) with serious mental illness (diagnosis of schizophrenia, psychosis or affective disorder) receiving three types of supported accommodation (high support, supported housing, floating outreach) and establish if quality of life outcomes differed between the three types of supported accommodation.

It aimed to answer the following questions:

1. Do people with serious mental illness living in supported housing have a better quality of life compared to people in high support accommodation?
2. Do people with serious mental illness living in floating outreach services have a better quality of life compared to people in high support accommodation?
3. Do people with serious mental illness living in floating outreach services have a better quality of life compared to people living in supported housing?

3.3.2 Systematic Review Methods

A search for studies that described quality of life outcomes for people with serious mental illness living in all types of supported accommodation was conducted in six electronic databases: ProQUEST & ASSIA, the Cochrane Library, CINAHL, MEDLINE, PsycINFO, and SCOPUS. A review of previous work on the topic informed identification of key words selected for the systematic search (Leff et al., 2009; Chilvers et al., 2010). Advice was sought from the subject liaison librarian at the university regarding how to generate the best search results. Subsequently, the candidate used combinations of the key words to test a number of search strings (phrases) for best results. All results were combined to avoid any loss of relevant studies; duplicates were removed.

A combination of keywords related to accommodation type and adults with severe mental illness (*resident* or hous* or accommod* or commun* or commu* or home**) AND (*support* or shelter* or outreach**) OR (*residential treatm* or residential facility**) OR (*supported hous* or public hous**) AND (*Adult**) AND (*Severe Mental Illness OR Persistent Mental illness*) were used in the search (see Appendix 1 for example search). To ensure that all relevant research was located, broad search terms were used due to the variability in how supported accommodation is defined internationally. No restrictions were placed on publication dates to ensure all possible studies were reviewed and considered. The search was first completed in September 2016; the last search was in April 2018.

For inclusion in the systematic review, studies had to meet the following criteria:

- (a) Primary study
- (b) Reported on interventions related to supported accommodation for people with serious mental illness
- (c) Reported quality of life outcomes.

Studies were excluded if they met the following criteria:

- (d) A validation study for a tool
- (e) Evaluation of an intervention.

Tool validation studies were excluded as these focused on the measurement of features of the living environment; while intervention evaluations were excluded as these focused on adjunct interventions delivered to the participant population. In the case of duplicate studies, publications were selected with the most information. For each study, the following data was extracted using a form devised by the researcher (see Table 1): sample size; diagnosis; age range and mean age; gender; ethnicity; country of recruitment; study design; housing type; QoL measure used. Initial data extraction was completed including extraction of means and standard deviations of QoL outcome scores.

Table 1: Data extraction table

Study	Number of participants	Mean age	Diagnoses reported	Ethnicity	Intervention: Supported accommodation type	QoL outcomes			Study quality: Measure/ Rating
						Subjective	Objective	Objective	
							Living conditions	Social functioning	
Aubry et al. 2015	930	39.4	Substance related problems; Psychotic disorder; major depressive disorder	White, Aboriginal, Black, Asian, Other	High support; Supported housing	Global Wellbeing	Living situation, finances, safety.	Leisure, social relations, family relations,	EPHPP Moderate
Brolin et al. 2015	370	49	Non-affective psychosis; affective psychosis; Neuropsychiatric Disabilities; other	Not reported	High support; Supported housing	-	Security and privacy, Control and choice about housing support	-	RTI Medium risk of bias
Brunt and Hansson 2002	51	High Support: 39 Supported Housing: 41	Psychosis	Not reported	High support; Supported housing	-	Autonomy; practical orientation	Involvement, support, spontaneity.	RTI Medium risk of bias
Brunt and Hansson 2004	76	High Support: 39 Supported Housing: 41	Psychosis	Not reported	High support; Supported housing	Global wellbeing	Finances, living situation	Work; leisure activities, family relations, social relations, health	RTI Medium to low risk of bias
Chan et al. 2003	204	High support: 49.8 Supported Housing: 50, Floating Outreach: 47.6	Inclusion criteria people with diagnosis of schizophrenia (DSM-IV)	Chinese	High support; Supported housing; Floating outreach	Life satisfaction	Total life events	Physical (health), psychological, social relationship	RTI Medium to low risk of bias
De Heer Wunderink et al. 2012	534	Supported Housing: 43.1 Floating Outreach: 43.8	Schizophrenia; mood/anxiety disorders; substance abuse; personality disorder	Not reported	Supported housing; Floating outreach	Global wellbeing	-	-	RTI Medium risk of bias
Jaeger et al. 2015	168	High support: 45.1 Supported Housing: 45.1	Schizophrenia	Swiss, Schengen area, Non-Schengen area		-	Activities of daily living, living conditions	Relationships, occupation/ leisure	RTI Medium to low risk of bias

Study	Number of participants	Mean Age	Diagnoses reported	Ethnicity	Intervention: Supported accommodation type	QoL outcome			Study Quality: Measure/ Rating
						Subjective	Objective	Objective	
							Living Conditions	Social Functioning	
Killaspy et al. 2016(b)	619	46.1	Schizophrenia, schizoaffective disorder, bipolar affective disorder depression or anxiety; other	White	High support; Supported housing; Floating outreach	Global wellbeing	-	-	RTI low risk of bias
Lambri et al. 2012	80	41.6	Schizophrenia, bipolar disorder or other psychosis	African Caribbean White British, European, South Asian	High support; Supported housing; Floating outreach	General wellbeing	Finances, living situation	Leisure, family relations, social relations, health, education.	RTI Medium to low risk of bias
Muijen et al. 1992	189	High Support: 35 Supported Housing: 33	Schizophrenia; mania; depression; neurosis	British or Irish; Afro-Caribbean; Other	High support Supported housing	-	-	Social Functioning skills	EPHPP Strong
Mulholland et al. 1999	90	High support: 42.4, Supported Housing: 51.6 Floating Outreach: 40.4	Schizophrenia; personality disorder; major affective disorder; schizoaffective disorder; other	Not reported	High support; Supported housing; Floating outreach	-	Self-care skills, domestic skills.	Social skills, community living skills	RTI Medium risk of bias
Simpson et al. 1989	34	High support: 45 Supported housing: 42, Floating outreach: 40	Schizophrenic psychosis, affective psychosis, other psychosis	Not reported	High support; Supported housing; Floating outreach	General wellbeing	Living situation, finances	Family relations, social relations, leisure, health.	RTI Medium risk of bias
Yanos et al. 2007	44	47.2	Psychosis, bipolar disorder, major depression, other	White (not Hispanic), Black (not Hispanic), Hispanic; Mixed, other, unknown	Supported housing; Floating outreach	-	Independence	Recreation, pro-social and occupational	RTI Medium risk of bias

The following three definitions of supported accommodation type (Priebe et al. 2009; Killaspy et al. 2016(a)) were used to match the supported accommodation described in included articles:

- 1) **High support accommodation** is provided in hospital or the community, with 24-hour staffing on site. Meals, other daily living activities and supervision of medication are provided for people with serious mental illness.
- 2) **Supported housing** is provided as tenancies in shared living, with staff based on site up to 24 hours a day. The focus is on rehabilitation, with people with serious mental illness being supported to gain independent living skills.
- 3) **Floating outreach** services provide support to people with serious mental illness living in their own self-contained tenancy, who are visited several times a week by support workers. Levels of support will reduce as the individual becomes more able to look after themselves and their home.

Matches were made based on living arrangements, number of hours staffing per week and type of input received from staff by residents (see Table 2).

Table 2: Matching of supported accommodation type

	Living arrangement	Staff hours	Type of support received
High support	Shared residences without tenancy	Staff available 24 hours, 7 days a week	All meals and other daily living activities completed by staff
Supported Housing	Shared residences with tenancy	Staff based on site between 8-24 hours per day, 7 days a week	Staff provide rehabilitation to increase people's independent living skills
Floating outreach	Self-contained tenancy/living in private home	Visiting staff (not based on site) 1-7 times per week	Staff support people to achieve personal goals related to daily living, social, leisure and work activities

QoL outcomes were extracted from the selected articles. QoL measures included in the identified studies were collapsed into three domains of quality of life:

- 4) **Wellbeing**: outcomes reported on overall happiness or satisfaction with current life situation or general wellbeing (Fakhoury and Priebe 2002).
- 5) **Satisfaction with living conditions**: outcomes reported on satisfaction with living situation, employment, education, income/finances, general safety.

- 6) **Satisfaction with social functioning:** outcomes reported on satisfaction with relationships with family and others, health (physical and mental), leisure and social activities (Barry and Zissi 1997).

The assessment of the quality of papers and risk of bias was carried out independently by the researcher and a colleague. The Effective Public Health Practice Placement [EPHPP] Quality Assessment Tool for Quantitative Studies (Thomas et al., 2004) was used for the two Randomised Control Trials included in the meta-analysis. This provides a total score indicating risk of bias. The RTI item bank tool (Viswanathan and Berkman 2011) was used to evaluate the risk of bias and precision of the observational studies. 19 items were selected from the RTI item bank to identify key areas of bias for the selected observational studies. An indicative score was assigned to indicate overall risk of bias. Both reviewers met following independently reviewing the selected studies. Any differences in scoring were discussed and agreement reached regarding allocation of the final score

3.3.3 Study selection

Following completion of the search from all data sources (database (n=5225) and other sources (n=15) including search of grey literature and identified studies) a total of 5240 records were identified (see Figure 1).

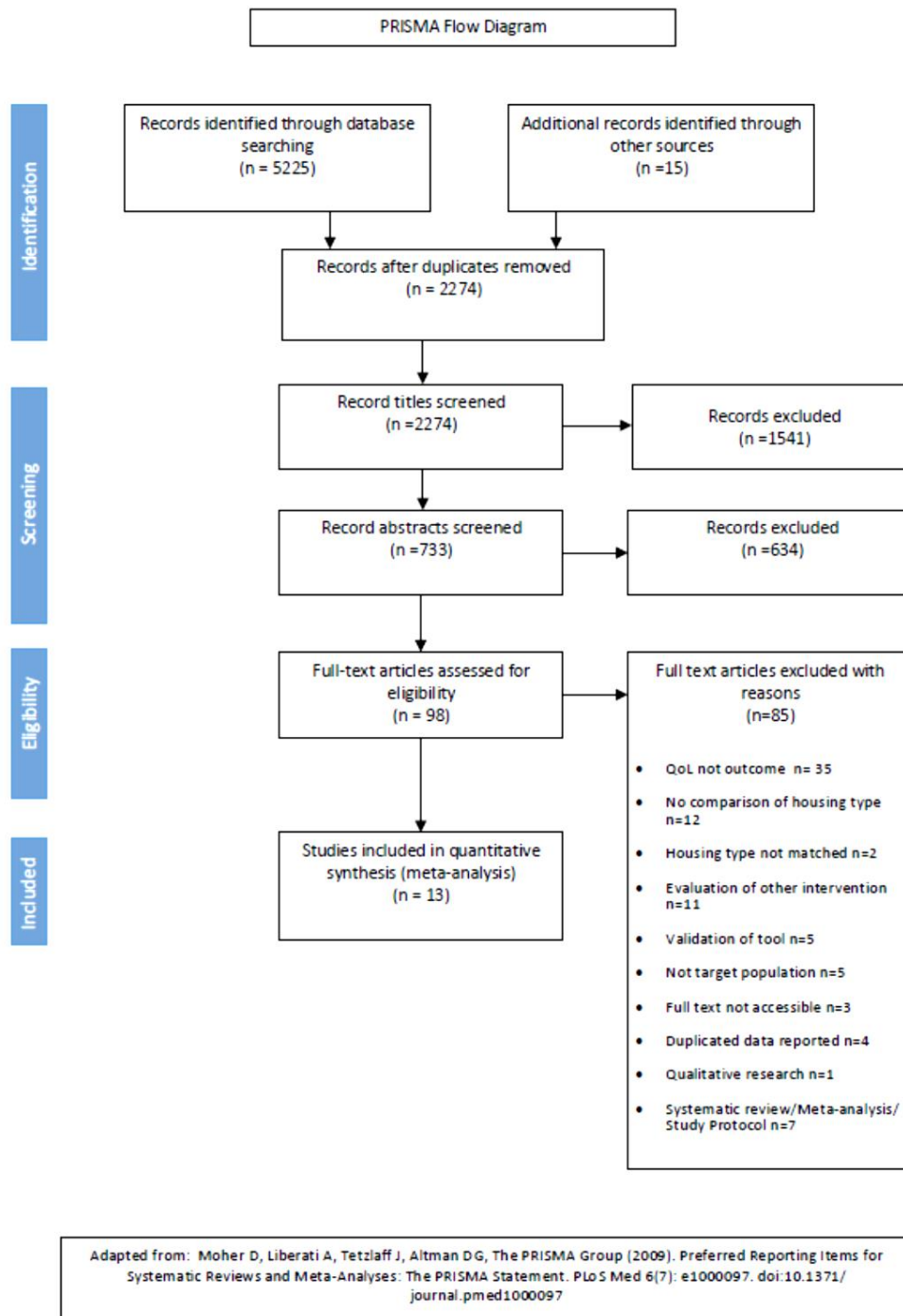


Figure 1: PRISMA flow chart

All data screening, assessment of quality and risk of bias was completed by the researcher and a colleague. If a difference in opinion on study selection was identified, these were discussed between the researcher and the other reviewer to agree whether a study was included or not. Both reviewers identified whether the study was to be included by recording yes, no or maybe in the database created. Once duplicates were removed, title screening was conducted on the remaining 2274 records using the inclusion criteria (population: people with serious mental illness; intervention: supported accommodation; outcomes: quality of life outcomes) followed by abstract screening on the remaining 733 records. 98 full text articles were assessed for eligibility. At this point the following information was recorded for each article in an excel database: publication year, study design, country, mean age, age range, gender, ethnicity, diagnosis, inclusion criteria for study, how participants were recruited, total number of participants, intervention type, intervention description, duration of study, quality of life outcomes reported (wellbeing and satisfaction with life, satisfaction with living conditions and satisfaction with social functioning) and assessments used (standardised and non standardised).

Following full text review, thirteen relevant studies were identified, published from 1989- 2016. There were a total of 3276 people with serious mental illness in the included studies: 457 receiving high support, 1576 receiving supported housing and 1243 receiving floating outreach. Five studies were from the UK (four from England and one from Northern Ireland), three studies from Sweden and one study each from the USA, Switzerland, Netherlands, Canada and Hong Kong.

Demographic information. Mean age was reported in all studies, however this was reported either across the combined participant group or by housing type, with mean ages ranging from 35 to 51.6 years. Mean age by accommodation type were high support 35-49.8; supported housing 33-51.6; and floating outreach 40-47.6. Ethnicity was reported in seven studies. Nine studies reported on the diagnosis of participants, with two others referring to participants having serious mental illness. *Supported accommodation type:* All thirteen studies included supported housing, with eleven studies including high support accommodation and seven studies including floating outreach accommodation.

QoL outcomes: Seven studies reported wellbeing and life satisfaction outcomes, ten studies reported satisfaction with living conditions outcomes and satisfaction with social functioning outcomes was reported in ten studies.

A total of nine meta-analyses were conducted, one for each quality of life outcome and pair of supported accommodation types.

3.3.4 Meta-analysis results

A separate meta-analysis was conducted for each quality of life outcome, comparing each pair of housing interventions: i.e. wellbeing, living conditions and social functioning, for high support vs supported housing, supported housing vs floating outreach, and high support vs floating outreach. Effect size Hedges' g and corresponding variance V_g are calculated for each study as follows.

$$g = \left(1 - \frac{3}{4df - 1}\right) \left(\frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}}} \right)$$

$$V_g = \left(1 - \frac{3}{4df - 1}\right)^2 \left(\frac{n_1 + n_2}{n_1 n_2} + \frac{\left(\frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}}} \right)^2}{2(n_1 + n_2)} \right)$$

g is the unbiased estimate (especially for small sample sizes between 20-50. (Durlak 1999)) of the standardised mean difference in outcome between two independent groups allocated to different housing types; V_g is the uncertainty in the estimate of mean difference and within-group(s) standard deviation; \bar{X}_1 and \bar{X}_2 are the sample means of the two comparison groups; n_1 and n_2 are its respective sample sizes; S_1 and S_2 are the sample standard deviations of the two groups; and $df = n_1 + n_2 - 2$ is the degrees of freedom used in the estimation of the within-group(s) standard deviation (Borenstein et al. 2009).

Random-effects models that take into account variation between studies are fitted to obtain pooled estimates for wellbeing, living conditions and social functioning for different pairs of housing interventions. Similar to Cohen's d , effect size Hedges' g is interpreted as 0.20 – 'small', 0.50 – 'medium' and 0.80 – 'large' (Cohen 1988). However, effect sizes should be interpreted cautiously, given factors such as quality of studies, uncertainty of estimates, the feasibility and clinical importance of the

findings, and contextualisation with results from relevant previous research (Durlak 2009).

The direction of g indicates the difference between housing types showing which results in better wellbeing, living and social functioning for people with serious mental illness. The confidence interval for g is indicative of the precision of the estimate. The wider the confidence interval, the larger the standard error; and the lesser the accuracy of the estimated g . A confidence interval inclusive of zero implies that the resulting effect is not statistically significant. Statistical significance indicates the generalisability of the results, since it implies that the observed effect g is not due to random chance but an actual difference between the two sets of observations.

Heterogeneity between studies is assessed using Higgins' I^2 statistic (Higgins et al. 2003), which measures the proportion of observed variance due to real differences in effect g rather than sampling error (random chance). Potential sources of heterogeneity cannot be detected quantitatively using either subgroup analysis or meta regression due to insufficient studies reporting on relevant characteristics. Sensitivity analyses are conducted using the leave-one-out method to identify outliers or influential studies. Publication bias is examined by funnel plots using the trim and fill method (see Appendix 2): although the results cannot be considered robust as the method is underpowered due to the limited number of studies and sample size. Random-effects model outputs are visually represented using forest plots.

3.3.4.1 High Support vs. Supported Housing

There were nine publications reporting on QoL outcomes in high support ($n=457$) and supported housing ($n=1576$). Five reported on wellbeing (Brunt and Hansson 2004; Chan et al. 2003; Killaspy et al. 2016(b); Lambri et al. 2012; Simpson et al. 1989); seven on satisfaction with living conditions (Brunt and Hansson 2002; Brunt and Hansson 2004; Chan et al. 2003; Jaeger et al. 2015; Lambri et al. 2012; Mulholland et al. 1999; Simpson et al. 1989); and eight on satisfaction with social functioning (Brunt and Hansson 2002; Brunt and Hansson 2004; Chan et al. 2003; Jaeger et al. 2015; Lambri et al. 2012; Muijen et al. 1992; Mulholland et al. 1999; Simpson et al. 1989).

Figure 2 is a set of forest plots depicting random-effects model results for all outcomes. A statistically significant g is found for satisfaction with living conditions ($g = -0.31$; $CI = [-0.47; -0.16]$) and satisfaction with social functioning ($g = -0.37$; $CI = [-0.65; -0.09]$), which suggests that people living in supported housing have better satisfaction with living conditions and social functioning than those living in high support settings. There is no evidence for a statistically significant difference in wellbeing between the two housing types ($g = -0.30$; $CI = [-0.70; 0.10]$). The size of all effects is 'small', as per Cohen's guidelines. Statistically significant heterogeneity between studies is found for wellbeing ($I^2 = 78.12\%$) and satisfaction with social functioning ($I^2 = 76.59\%$) outcomes.

Sensitivity analyses reveal the most influential studies to be Killaspy et al. (2016(b)) for wellbeing, and Muijen et al. (1992) for social functioning. The omission of Muijen et al. (1992) produces no considerable change in inference; but the omission of Killaspy et al. (2016(b)) results in a statistically significant g for wellbeing ($g = -0.53$; $CI = [-0.77; -0.29]$), thereby implying that people living in supported housing experience better wellbeing than those in high support accommodation, with the size of this effect being 'medium'. Publication bias in studies was found for wellbeing and satisfaction with living conditions QoL outcomes, although this does not change the conclusions substantially.

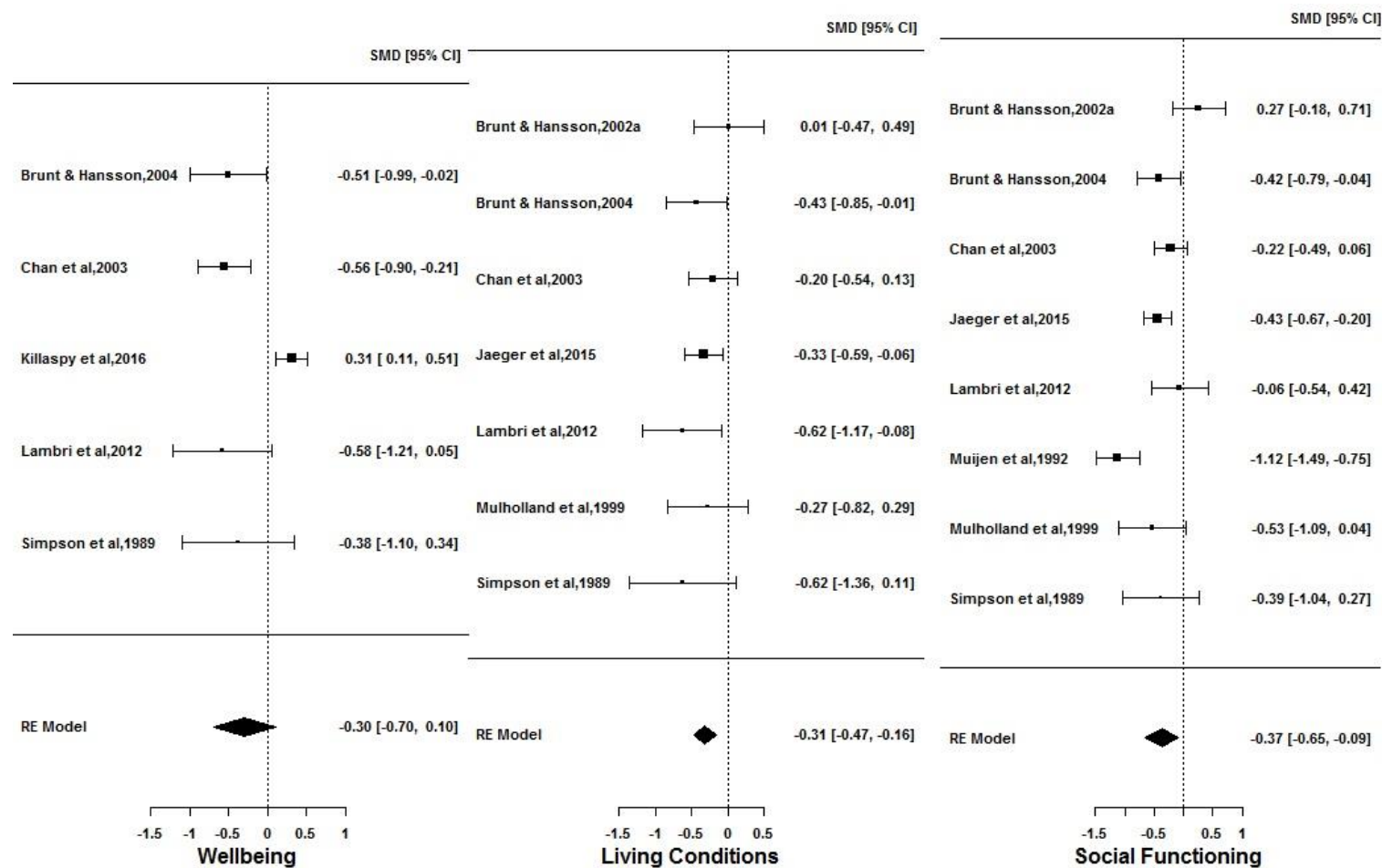


Figure 2: Comparison of wellbeing, satisfaction with living condition and satisfaction with social functioning outcomes for individuals in High Support and Supported Housing

Data was available which allowed the satisfaction with living conditions outcome to be further split into satisfaction with finances and living situation sub-categories to see if these outcomes were influential between high support and supported housing and affected the conclusion in any way (Appendix 3). Although satisfaction with living conditions overall results in a statistically significant difference of 'small' effect size between people in high support and supported housing, its sub-category, finances, fails to exhibit a significant difference ($g = -0.31$; CI = [-0.66; 0.03]); while living situation shows a significant difference ($g = -0.50$; CI = [-0.96; -0.05]) of 'medium' effect size between the two models of housing: with a superior living situation experienced by those in supported housing.

The outcome for satisfaction with social functioning was also further split into sub-categories: social, leisure, family and health (Appendix 4). Although satisfaction with social functioning results in a statistically significant difference of 'small' effect size between people living in high support and supported housing, its sub-category, family, fails to exhibit a significant difference ($g = -0.12$; CI = [-0.46; 0.23]) - while social has a significant difference ($g = -0.51$; CI = [-0.78; -0.25]) of 'medium' effect size; leisure shows a significant difference ($g = -0.78$; CI = [-1.19; -0.36]) of 'large' effect size; and health has a significant difference ($g = -0.22$; CI = [-0.39; -0.06]) of 'small' effect size between the two models of housing: with superior outcomes experienced by those in supported housing.

3.3.4.2 Supported Housing vs. Floating Outreach Services

There were nine publications reporting on QoL outcomes in supported housing ($n=1576$) and floating outreach ($n=1243$). Six reported on wellbeing (Aubry et al. 2015; Chan et al. 2003; De Heer Wunderink et al. 2012; Killaspy et al. 2016b; Lambri et al. 2012; Simpson et al. 1989); seven on satisfaction with living conditions (Aubry et al. 2015; Brolin et al. 2015; Chan et al. 2003; Lambri et al. 2012; Mulholland et al. 1999; Simpson et al. 1989; Yanos et al. 2007); and five on satisfaction with social functioning (Chan et al. 2003; Lambri et al. 2012; Mulholland et al. 1999; Simpson et al. 1989; Yanos et al. 2007).

Forest plots of the random-effects model results for the three QoL outcomes are shown in Figure 3. Estimated g did not achieve statistical significance for wellbeing ($g = 0.24$; CI = [-0.07; 0.55]), satisfaction with living conditions ($g = -0.40$; CI = [-0.82; 0.03]), nor satisfaction with social functioning ($g = -0.12$; CI = [-0.45; 0.20]): thereby

indicating a lack of evidence in rejecting the hypothesis that the overall quality of life experienced by people living in supported housing and floating outreach services are similar.

Although not significant, the effects are quite small for wellbeing and satisfaction with social functioning, and close to medium for satisfaction with living conditions. In the presence of any difference, wellbeing seems to be better for people living in supported housing, whereas satisfaction with living conditions and social functioning is better for people living in floating outreach. Statistically significant heterogeneity between studies is found for all the outcomes: wellbeing ($I^2 = 89.65\%$), satisfaction with living conditions ($I^2 = 92.41\%$), and satisfaction with social functioning ($I^2 = 59.57\%$).

Sensitivity analyses reveal the most influential studies to be Aubry et al. (2015) for satisfaction with living conditions, and Chan et al. (2003) for social functioning. The omission of Aubry et al. (2015) results in a statistically significant g for satisfaction with living conditions ($g = -0.54$; CI = [-0.91; -0.17]), implying that people living in floating outreach experience better satisfaction with living conditions than those in supported housing, with the size of this effect being 'medium'. The omission of Chan et al. (2003), however, produces no considerable change in the results. Publication bias in studies is found for the QoL outcomes of wellbeing and social functioning, although it does not change the conclusions substantially. No reasonable differences are observed on splitting QoL outcomes into sub-categories.

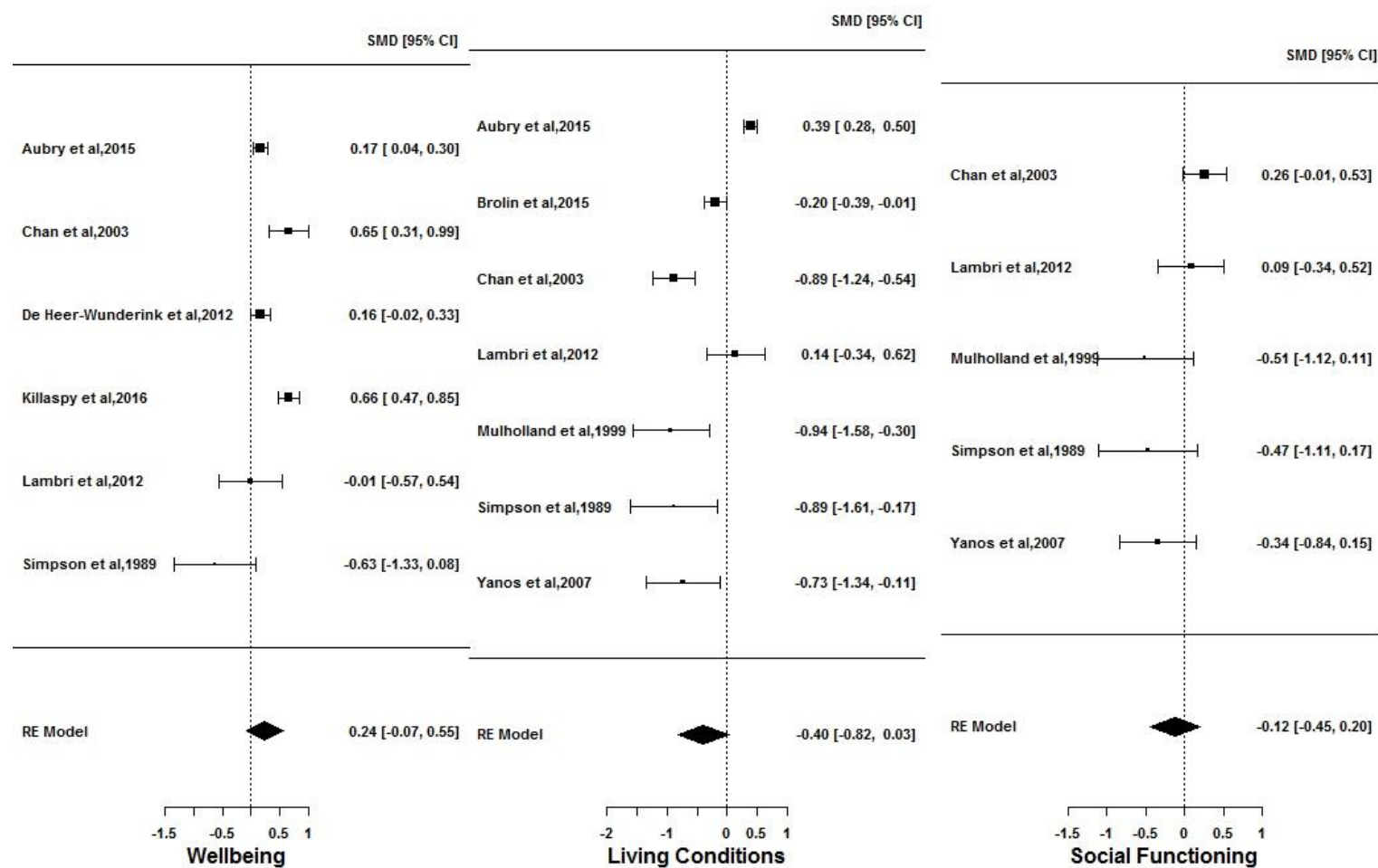


Figure 3: Comparison of wellbeing, satisfaction with living conditions and satisfaction with social functioning outcomes for individuals in Supported Housing and Floating Outreach

3.3.4.3 High Support vs. Floating Outreach Services

Five publications reported on QoL outcomes in high support (n=457) and floating outreach (n=1243). Four reported on wellbeing (Chan et al. 2003; Killaspy et al. 2016b; Lambri et al. 2012; Simpson et al. 1989); four on satisfaction with living conditions (Chan et al. 2003; Lambri et al. 2012; Mulholland et al. 1999; Simpson et al. 1989); and four on satisfaction with social functioning (Chan et al. 2003; Lambri et al. 2012; Mulholland et al. 1999; Simpson et al. 1989).

Figure 4 is a set of forest plots depicting the random-effects model results for the three outcomes. A statistically significant g with large effect size is found for satisfaction with living conditions only ($g = -0.95$; CI = [-1.30; -0.61]), suggesting that people living in floating outreach services experience enhanced satisfaction with living conditions compared with those in high support settings. A non-significant and very small effect for wellbeing ($g = -0.07$; CI = [-0.88; 0.73]) and small effect for satisfaction with social functioning ($g = -0.40$; CI = [-0.93; 0.13]) imply a lack of evidence in rejecting the hypothesis that wellbeing and satisfaction with social functioning experienced by people living in high support and floating outreach services are similar.

Where there was a difference, both QoL outcomes seem to be slightly better for people living in floating outreach. Statistically significant heterogeneity between studies is found for wellbeing ($I^2 = 93.32\%$) and satisfaction with social functioning ($I^2 = 76.04\%$) only.

Sensitivity analyses reveal the most influential studies to be Killaspy et al. (2016b) and Simpson et al. (1989) for wellbeing; Lambri et al. (2012) for satisfaction with living conditions; and Chan et al. (2003) for social functioning. The omission of none of these studies results in anything different from what has already been observed. Publication bias in studies is found only for social functioning, although it does not change the conclusions substantially. No reasonable differences are observed on splitting QoL outcomes into sub-categories.

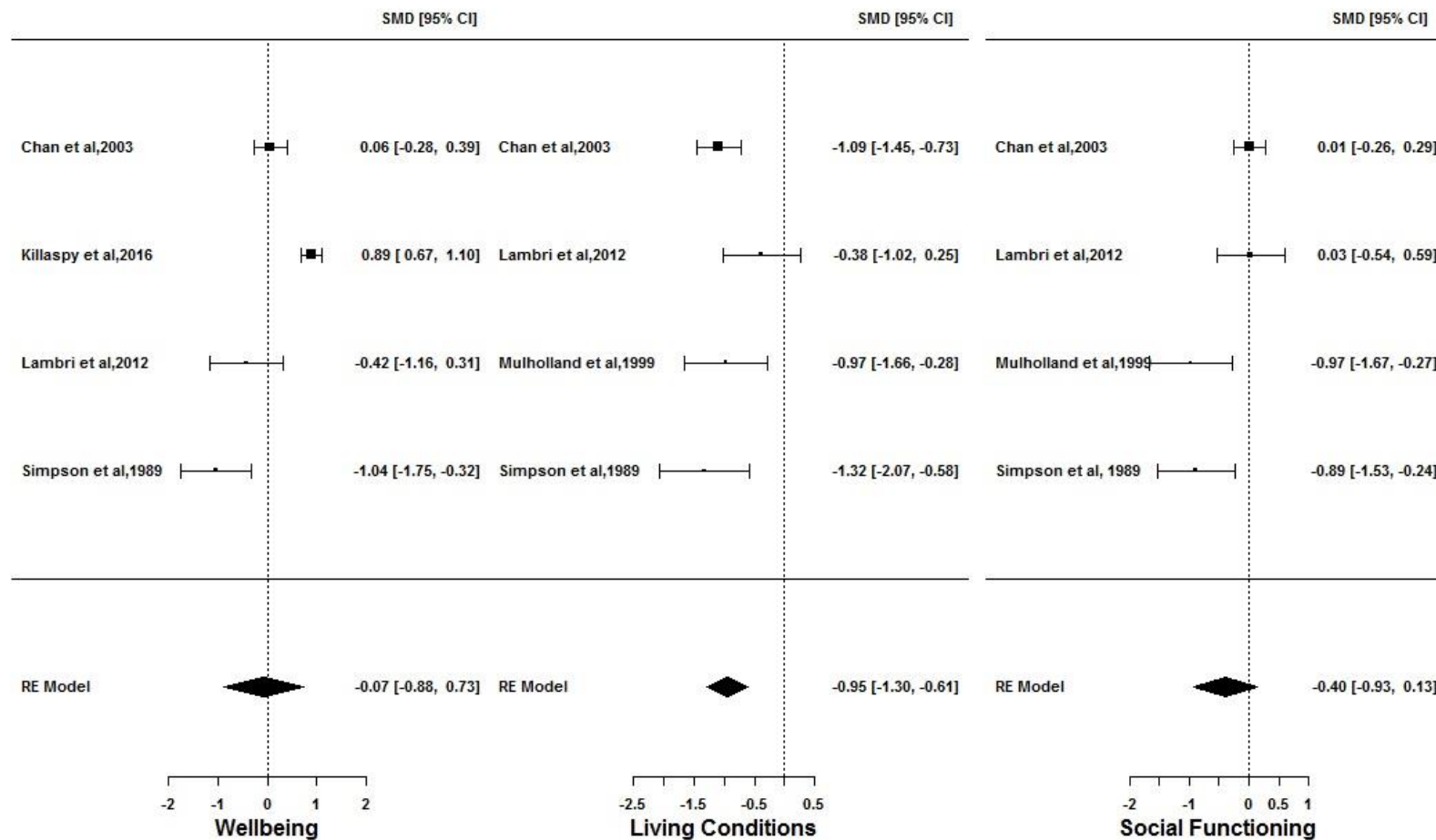


Figure 4: Comparison of wellbeing, satisfaction with living conditions and satisfaction with social functioning outcomes for individuals in High Support and Floating Outreach

3.3.5 Meta-Analysis Discussion

This review of 13 studies investigated the performance of three types of supported accommodation interventions on three QoL outcomes; wellbeing, satisfaction with living conditions and satisfaction with social functioning for people with severe mental illness. High support accommodation is found to offer the least favourable quality of life to people in comparison to both supported housing and floating outreach. Difference in satisfaction with living conditions are more pronounced and statistically significant between the 3 supported accommodation types. People had statistically significant satisfaction with social functioning in supported housing compared to high support accommodation. There is no significant difference between the 3 types of supported accommodation in relation to wellbeing. Statistically significant heterogeneity with high I^2 statistics are found for seven of the meta-analyses conducted. Sensitivity analyses reveal six out of thirteen studies to be outliers across all meta-analyses performed, however, the majority of these do not cause any change in inference upon omission (Appendix 4). The meta-analysis was not able to investigate the potential influence of cultural differences in the way supported accommodation is provided due to variations in value systems, health systems and configuration of services internationally. For example, Chan et al.'s study in Hong Kong, reported that participants in floating outreach had worse satisfaction with wellbeing than participants living in supported housing and high support, acknowledging that this was different to results reported in research from Western countries and may be influenced by culture. This is acknowledged as a challenge for systematic reviews and research related to supported accommodation (McPherson et al. 2018(a)) and one of the reasons there is a lack of a strong evidence base for supported accommodation as an intervention for people with serious mental illness (Chilvers et al. 2006; Tabol et al. 2010).

A discussion of the results considering the wider context of QoL research with people with serious mental illness is now provided.

3.3.5.1 High Support Accommodation

The main finding is that high support accommodation is found to offer the least favourable quality of life for people, in comparison to both supported housing and floating outreach. First, the meta-analysis showed that satisfaction with living conditions was better for people living in supported housing compared to high support

accommodation, with subgroup analysis showing a medium effect size for satisfaction with living situation. The potential reasons for this difference are that the purpose of high support accommodation differs from supported housing, with routine daily living activities delivered by staff for people with serious mental illness and a safe environment maintained which manages risk. Consequently, high support environments are often experienced by people with serious mental illness as restrictive and causing reducing autonomy (Bredski et al. 2015). This contrasts with people with serious mental illness living in supported housing, where they have increased choices about their living environment and how they organise their daily routine. Such a choice has been shown to positively affect satisfaction with living conditions (Nelson et al. 1998; Hobbs et al. 2002; Padgett 2007; Piat et al. 2008; Kloos and Shah 2009; Mannix-McNamara et al. 2012).

The analysis also found that satisfaction with social functioning was better in supported housing than high support accommodation, particularly in social and leisure sub-categories. The enhanced rehabilitative focus of supported housing focuses on people with serious mental illness increasing their participation in social and leisure activities (Killapsy et al. 2016(a)). Satisfaction with activities is also shown to be positively related to the level of participation in activities (Eklund 2009; Sánchez et al. 2016). Lengthy stays in high support accommodation can increase dependency on staff and services (Loch 2014) and result in reduced opportunities to participate in social and leisure activities within established social networks outside the high support environment (Dickinson et al. 2002).

Finally, wellbeing outcomes were better for people in floating outreach compared to high support accommodation. A possible reason is that if accommodation provides increased choice and autonomy, people's wellbeing is higher (Nelson et al. 2003; Kyle and Dunn 2008); with perception of the physical environment and a positive social climate also influential (Marcheschi et al. 2015). While this could be expected as there is a significant difference in the level of support within the two types of supported accommodation, other studies have shown that this is not always the case, and rating of wellbeing can be similar for people with serious mental illness across high support and floating outreach accommodation as a result of reduced life expectations (Priebe 2007). A person's assessment of their wellbeing can also be influenced by the impact of negative symptoms such as motivation and depression (Ruggeri et al. 2002; Fleury et al. 2018; Saperia et al. 2018), and a greater number of unmet needs (Hansson and

Björkman 2007; Ritsner 2012a; Emmerink and Roeg 2016). However I was unable to establish if these factors had impacted on the results of the meta-analyses, as this information was not included in all the identified studies.

3.3.5.2 Supported Housing and Floating Outreach Accommodation

An additional finding was the absence of a significant difference in satisfaction with living conditions and satisfaction with social functioning between floating outreach and high support accommodation; and all outcomes between supported housing and floating outreach accommodation. By definition, floating outreach accommodation provides the greatest opportunity for people with serious mental illness to have choice and control of their lives. Potential reasons explaining the lack of difference between this and more supported housing types are that people living in floating outreach services can be more socially isolated as a result of living alone and involved in less social activity (Brolin et al. 2015; Eklund et al. 2017). This can contribute to people with serious mental illness feeling less safe and secure in their homes (Whitley et al. 2008), potentially affecting satisfaction with living conditions.

It has also been reported that initial gains in satisfaction with social functioning made by people with serious mental illness in supported accommodation are generally maintained, but do not increase over time (McInerney et al. 2010), potentially explaining the lack of significant difference here.

3.3.5.3 Interpretation

This systematic review and meta-analysis on supported accommodation for people with serious mental illness explores information on key issues of importance, including wellbeing, satisfaction with living conditions and social functioning. The reported benefit of considering QoL outcomes are that it captures several important aspects of people's lives (Oliver 1997), and therefore provides data on client-centred and person-orientated outcomes. However, ratings may capture the moderated life expectations of people with serious mental illnesses, as they have adjusted and adapted to reduced life opportunities (Priebe 2007; Forrester-Jones et al. 2012). People with serious mental illness report that having control over their lives, rebuilding a positive identity and having a sense of belonging through relationships and participating in social, leisure and work activities are all important (Slade 2012; Tew et al. 2012). These opportunities for choice and autonomy are available to people

with serious mental illness in supported accommodation with reducing levels of support (Forchuk et al. 2006; Nelson et al. 2007; Taylor et al. 2009).

3.3.5.4 Meta-Analysis Implications

While the results of the meta-analysis need to be treated tentatively they do align with other studies which have considered QoL outcomes for people with serious mental illness showing that the variation of features in the different supported accommodation types can have an impact on these outcomes (McGonagle and Allan 2002; Nelson et al. 2007; Forchuk et al. 2006; Mannix-McNamara et al. 2012). It is therefore proposed that achieving improved QoL for people with serious mental illness in supported accommodation is important. The outcomes suggest that there needs to be continued consideration of how services support people with serious mental illness to live in the least restrictive supported accommodation as the meta-analysis suggests that people experience better QoL outcomes in these types of supported accommodation. Features of these environments that support improving QoL reported in other studies suggest that creating opportunities for individuals to participate in activities which enable increased satisfaction social functioning can support their recovery (Eklund 2009; Priebe et al. 2010; Ritsner et al. 2012(b); Killaspy et al. 2014; Townley 2015; Sánchez et al. 2016). A more robust exploration of how improving QoL outcomes within high support environments for people with serious mental illness needs to be considered as this can be a facilitator for people to have reduced lengths of stay in high support accommodation and facilitate moves to supported accommodation with lower levels of support (de Girolamo et al. 2014; Killaspy et al. 2015).

3.3.5.5 Meta-Analysis Limitations

This study has a number of limitations. The number of studies included in each meta-analysis is small, ranging between three and eight (Higgins et al. 2009; Bender et al. 2017). This can result in an under-estimation of the average population effect size and average sampling error (Borenstein et al. 2009). With a limited number of studies, confidence intervals from random-effects models are wider and statistical power lower, leading to results that need to be interpreted with caution (Durlak 2009). Accurate analyses of between-study variance require meta-analyses based on a substantial number of studies, which were not available in this analysis.

The inclusion of studies with different experimental designs is justified when appropriate quality assessment is completed (Shrier et al. 2007), and as a result, the

introduction of heterogeneity and bias is unavoidable (Ioannidis et al. 2007; Ioannidis et al. 2008). Exploring what creates this heterogeneity is therefore important in the interpretation of the meta-analyses. However, inconsistent reporting of data across the included studies meant that potential sources of heterogeneity could not be analysed (Higgins et al. 2003). This would have allowed exploration of potential differences in how supported accommodation services are provided for example exploring differences between countries or considering if age or ethnicity influenced estimation of effect sizes. Publication bias assessed from funnel plots using the trim and fill method produced results that are not adequately reliable, because they do not meet the rule of thumb of at least 10 studies (Sterne et al. 2011; Appendix 4).

While there are limitations to the meta-analysis, a systematic review of QoL outcomes in supported accommodation has not previously been conducted. The tentative findings are comparable to previously published research on differences in outcomes for people in different types of supported accommodation and highlight that there is a lack of consistency in considering wellbeing, satisfaction with living conditions and social functioning as outcomes for people with serious mental illness living in supported accommodation. There is potentially always going to be a lack of strong evidence based on randomized control trials for supported accommodation as an intervention. This is due in part to ethical considerations of randomisation with this population and feasibility of carrying out this research as a result, suggesting that alternative study designs need to be considered (Killaspy et al. 2019).

3.3.6 Conclusions

As support reduces in supported accommodation, from high support to supported housing to floating outreach, there is an indication that QoL increases. Satisfaction with social functioning and living conditions are better for people with serious mental illness living in supported housing compared to high support accommodation. People with serious mental illness living in floating outreach services have better general wellbeing compared to the other supported accommodation types. As both satisfaction with living conditions and satisfaction with social functioning were different across the three supported accommodation types, it is important to consider which contextual factors are driving these outcomes.

The meta-analysis shows there are differences in QoL outcomes for people with serious mental illness across the three supported accommodation types. This

suggests that outcomes improve for people with serious mental illness when they reside in supported housing and floating outreach accommodation. These types of supported accommodation provide opportunities for people to develop living skills and have increasing amounts of choice about how they live their lives. These factors have been identified as important in supporting recovery for people with serious mental illness (Borg and Davidson 2008; Browne et al. 2008).

However, a significant number of people with serious mental illness continue to have long stays in high support accommodation. This can increase dependence on services and limit recovery, as there are often less opportunities for participation in daily living and social activities in these environments (Dickinson et al. 2002; Loch 2014). A range of factors are associated with people remaining in high support accommodation for long periods of time, including diagnosis of psychosis, involuntary admission, being unemployed and unstable accommodation status (Tulloch et al. 2008; Newman et al. 2018).

The factors associated with people with serious mental illness moving from high support accommodation to supported housing and floating outreach services have not been identified. As services and clinicians are increasingly focused on supporting recovery for people with serious mental illness (Merryman and Riegel 2007; Leamy et al 2011; Slade et al. 2014; Petersen et al. 2015), it is important to understand what these factors are to support decision-making and intervention in practice.

4 Contextual factors and supported accommodation

To determine what factors predict what type of supported accommodation people with serious mental illness move into, consideration of the contextual factors within supported accommodation will now be discussed, using social-ecological models.

4.1 Social-ecological models

Social ecology offers a view of human ecosystems, comprising the combined impact of architectural, institutional and culturally symbolic influences on behaviour and wellbeing (Stokols 2018). These “human in context relationships” (Wright and Kloos 2007) are particularly useful for understanding the experiences of people with serious mental illness within the various contexts they encounter.

Bronfenbrenner (1979) proposed an “ecology of human development” which identifies a relationship between human beings and the properties of the immediate setting they live in, influenced by inter-relationships between these settings and the wider context they are embedded in. Bronfenbrenner described the “ecological environment” as a nested arrangement of systems, consisting of micro, meso, exo and macro systems. Applying this systems approach to supported accommodation, the microsystem constitutes the living environment which the person with serious mental illness lives in and describes the pattern of activities, roles and interpersonal relations experienced by them in supported accommodation, which has particular physical and material characteristics.

The mesosystem comprises the inter-relationships among two or more settings in which the person with serious mental illness actively participates as a result of being in supported accommodation; this could include seeing family, social activities or going to work. The exosystem has an indirect influence on the person with serious mental illness; events occur that affect, or are affected by, what happens within the supported accommodation. This could include the impact of staff’s personal circumstances on their ability to consistently support the individual, or disruption within the supported accommodation. The macro system describes intra-societal relationships, which incorporate wider societal influences about how services are organised, delivered and prioritised, influenced by cultural beliefs, economic and political circumstances.

Bronfenbrenner’s social-ecological theory is important as it considers all aspects of the environment that can influence the individual. However, there is complexity in

understanding the combined impact of multiple environments on the person at any given time. Stokols (2018) suggests this can make it difficult to apply, particularly when considering contextual influences at times of transition or change.

However, Moos and Igra (1980) developed a social-ecological informed conceptual framework to explore the relationships between four domains of the environment, and the determinants and impact of these domains within supported accommodation environments for individual and group functioning. They identified physical and architectural, policy and programme, resident and staff and socio-environmental resources, which combined, affect the type of social environment that arises within supported accommodation settings. Moos (1980) highlighted that the institutional context can directly affect the social climate created, which can affect outcomes for individuals.

Building on this work, Moos (2002) proposed an integrated model to define how context impacted on coping, describing enduring environmental conditions (social climate, resources and stressors) and personal factors (cognitive abilities, stable traits and psychiatric factors) that could influence how someone copes and adapts to life changes. This model was applied by Yanos and Moos (2007) to determine functional and wellbeing outcomes for people with schizophrenia. They concluded they had not found evidence that enduring environmental conditions directly impacted on personal factors.

Kloos and Shah (2009) applied social ecology theory based on Moos' work to inform research regarding which factors of housing and neighbourhood environments were critical for adaptive functioning, health and recovery for people with serious mental illness. They reported that the advantage of using social ecology for this population lay in the consideration of both physical and social environments, the focus on identification of compatible environments that promote functioning and a multifaceted understanding of how the environment affects functioning: it can limit or support individuals' functioning. The results confirmed that physical and social environment factors were important for the functioning of people with serious mental illness; how the relationship between the individual and their home environment can have a positive impact on their adaptation and recovery within their community; and that poorer physical environments created stress and were disruptive to people's recovery.

Thus there is value in defining the personal and environmental factors within supported accommodation environments to understand how these support individuals' recovery. The following personal factors (age, gender, ethnicity and diagnosis and symptomology) and environmental factors (physical, social and attitudinal) will be now be considered in relation to supported accommodation environments.

4.1.1 Personal factors

Personal factors routinely considered in research related to supported accommodation are age, gender, ethnicity, diagnosis and symptomology.

Age

The age of a person with serious mental illness can be indicative of a longer-lived experience of their mental illness, with subsequent effects on self-care, social, occupational and cognitive functioning. The onset for schizophrenia or bipolar disorder occurs in similar age ranges for men and women. For men, it is at age 15-25; for women, age 25-35 (Baldessarini et al. 2012; Ochoa et al. 2012). For major depressive disorders, the onset occurs earlier in women (during their early 20s); compared to men (late 20s) (Schuch et al. 2014). The later onset of schizophrenia and bipolar disorder for women leave them more likely to have established living skills and social networks compared to men, where earlier onset leaves them more dependent on supported housing (Kidd et al. 2013). However, there is mixed evidence for whether age affects level of participation or QoL, with some indications that it has no impact (Eack et al. 2007; Bejerholm 2010; van Liempt et al. 2017); while other studies have shown that age is a vulnerability factor for worsening objective QoL (Ruggeri et al. 2005) and reduced participation in social networks (Pentland et al. 2003; Forrester-Jones et al. 2012).

Gender

In addition to the difference in established living skills and social networks for women with serious mental illness compared to men, there is gender bias in accommodation allocation, with men with serious mental illness perceived as more risky and troublesome by providers, which can result in them living in a poorer standard of housing (Kidd et al. 2013).

Ethnicity

There is variation in how people access services and the care received for ethnic minority versus ethnic majority groups (Bhui et al. 2003). In relation to mental health services in the UK, there can be an over-representation of ethnic minority groups in relation to compulsory treatment, delay in accessing support from mental health services and discrimination within services (Bansal et al. 2014). There is limited research looking specifically at ethnicity and supported accommodation. Where this has been considered, the focus has been on potential differing outcomes for people from ethnic minority groups.

Diagnosis and symptomology

The occurrence of schizophrenia and bipolar disorder is reported as equal between men and women. However, research shows that women are twice as likely to have a diagnosis of major depressive disorder as men. The effect of symptoms experienced in relation to these diagnoses has been considered when looking at QoL and participation outcomes in supported accommodation. Negative symptoms of schizophrenia, particularly lack of motivation, depression and anxiety, grandiose thinking and the euthymic nature of bipolar disorder mean that people need higher levels of support, due to significant disruption to self-care, social, occupational and cognitive functioning. The subsequent impact on the participation and QoL of people with serious mental illness means they can become isolated and involved in less social activity (Borg and Kristiansen 2004, Chesters et al. 2005, Killaspy et al. 2014; Stadnyk et al. 2013).

4.1.2 Environmental factors

Environmental factors across all supported accommodation types will be considered in terms of physical, social and attitudinal environments.

4.1.2.1 Physical

Personalisation of space and opportunities for privacy are the most frequently reported physical environment issues that facilitate participation (Nelson et al. 1998; Borg et al. 2005). People with serious mental illness report greater life satisfaction and increased participation when they have increased opportunities for choice and autonomy to decide how they manage their physical environment, including choosing how they personalise and furnish their space, what equipment and other objects they

need to support personal and domestic activities and to pursue their interests (Hansson et al 2002; Nelson et al. 2007; Bejerholm 2010; Marcheschi et al. 2013). In high support and supported housing, design and layout of the overall physical environment is important in facilitating social interactions, enabling a balance between private and communal space for people with serious mental illness (Marcheschi et al. 2016).

High support environments are often experienced by people with serious mental illness as restrictive and reducing autonomy (Bredski et al. 2015), due to reduced opportunities to participate in routine living activities. This can result in significant amounts of unstructured time, reduced productivity and low satisfaction with quality of life (Leufstadius et al. 2003; Edgelow and Krupa 2011).

4.1.2.2 Social

Systems and policy

The length of stay for people with serious mental illness in high supported accommodation can be impacted by system level factors linked to lack of suitable supported accommodation available for them to move into, restricted financial resources to fund a support package, or lack of capacity within local support provider services to fulfil packages of care (Tulloch et al. 2012; Afilalo et al. 2015). This creates a barrier to participation: it can lead to increased dependency on staff and services (Loch 2014) and continued limited opportunities to participate in social and leisure activities within established social networks outside the high support environment (Dickinson et al. 2002) or pursue employment (Mirza et al. 2008). Longer periods of time between stays in high support accommodation are shown to have a positive effect on participation and QoL, as people with serious mental illness re-establish routines and social networks (Browne et al. 2004; Kalseth et al. 2016).

There is some evidence that supported accommodation, which people with serious mental illness move to following a stay in high support accommodation, can reduce the need for a further stay in the latter: with supported housing and floating outreach both identified as being supportive by Sfectu et al. (2017). However, Priebe et al. (2009) showed that living with other people resulted in higher involuntary readmission rates to high support accommodation, while living alone resulted in lower involuntary admissions. Being detained under mental health legislation – being admitted to hospital without their consent (involuntary or formal admission) or placed on a

Compulsory Treatment Order (CTO) which manages aspects of their lives in supported accommodation – has been shown to affect the participation of those with serious mental illness, due to reduced choice and autonomy (Priebe et al. 2011).

Identifying needs to determine the level of support which people with serious mental illness require in supported accommodation is important in facilitating what type of activities they will participate in. In floating outreach accommodation, support may be limited to meeting daily living activities, owing to lack of funding and time to support extending participation in the local community or through wider roles such as education or work (Sandhu et al. 2017). This means that people with serious mental illness may continue to have a range of unmet needs which affects their wellbeing (Hansson and Björkman 2007; Ritsner 2012b; Fleury et al. 2013; Emmerink and Roeg 2016), with a greater number of self-rated unmet needs shown to impact on health and social relations (Lasalvia et al. 2005).

Conversely, having fewer unmet needs and greater social support has a positive impact on subjective QoL (Bengtsson–Tops and Larsson 2001; Eack et al. 2007). For people with serious mental illness, the opportunity to access self-directed support, which provides increased choice and control over how their support needs are met, has been shown to enable participation in activities beyond personal and daily living needs, supporting access to education and employment (Hamilton et al. 2016).

Formal support from paid support workers and informal support from friends and family are both important in how satisfied people with serious mental illness are with their lives and level of participation. The focus of formal and informal support can differ. Fleury et al. (2013) demonstrated that formal support focused more on health-related needs (psychotic symptoms, physical health, drugs, psychological distress, safety to self, safety to others, and alcohol), while informal support from family tended to focus on looking after the home and intimate relationships. The level of input from formal and informal support is shown to vary between types of supported accommodation, with people living in high support and supported housing receiving the majority of their support from paid support workers, while those living in floating outreach tend to receive more support from family members (Bengtsson–Tops and Larsson 2001; Fleury et al. 2013). Service performance mediates the relationship between a person with serious mental illness' needs and outcomes in supported accommodation (Roux et al. 2016). Initial gains in satisfaction with social functioning

made by people in supported housing are generally maintained but do not increase over time (McInerney et al. 2010).

Satisfaction with living situation, rating of general wellbeing and participation in activity can all be influenced by the social climate which people with serious mental illness live in (Mares et al. 2002; Lencucha et al. 2008). Living with other people in high support or supported housing accommodation provides opportunities for social interaction; however, differences in health and functional status can impact on the type and quality of interactions (Bonifas et al. 2014). The nature of relationships can be supportive where people establish friendships; or inhibitive, where other residents' behaviour can be disruptive and leave people feeling less secure in their environment (Peterson et al. 2015).

For those living more independently in floating outreach, this can support or inhibit establishing or maintaining social networks. Having more autonomy and living independently can provide increased opportunities for participation for some (Hansson et al; 2002; Piat et al. 2008; Bejerholm 2010). For others, it can result in their being more socially isolated and involved in less social activity (Brolin et al. 2015; Eklund et al. 2017), as a result of not having established links within their local community (Townley et al. 2009).

4.1.2.3 Attitudinal

Discrimination and stigmatisation are contextual factors which can affect participation and QoL for people with serious mental illness within supported accommodation. For some, living in supported housing is considered to have recreated institutionalisation in the community. In these cases, they remain in supported housing for years, creating dependency on staff and services, discouraging them from more independent living (Fakhoury and Priebe 2007). Within supported accommodation, relationships between staff and people with serious mental illness are important in facilitating participation. Pessimistic staff attitudes regarding prognoses and the ability to achieve positive outcomes can impact on participation, perpetuating attitudes that those with serious mental illness are not able to access education and employment (Perkins and Repper 2013). Staff attitudes have also been shown to contribute to delayed discharge from high support accommodation (Ross and Goldner 2009; Killaspy et al. 2015), or result in supported accommodation with higher levels of support than what is needed by the individual (de Girolamo 2014).

The location of some supported accommodation can be stigmatising. It can place people with serious mental illness in geographical areas which effectively segregate them from the wider community as a result of socioeconomic issues and neighbourhood design (Bejerholm 2010; Yates et al. 2011; Byrne et al. 2013). The result is they may end up less inclined to participate in social activities due to not feeling safe in the community or encountering stigmatising attitudes when they do access local facilities (Townley et al. 2009; Collier and Grant 2018).

These factors will be utilised as variables to address Research Question 2: What personal and environmental factors predict moving from high support to supported housing and floating outreach-supported accommodation for people with serious mental illness?

5 Methods

5.1 Method

5.1.1 Post-positivist position of research

This study aims to ascertain which of the identified personal and environmental factors predict the type of supported accommodation which people with serious mental illness move on to. It is important to establish a more in-depth understanding of the factors which facilitate placement in supported accommodation that support recovery for people with serious mental illness to inform decision-making and intervention in practice. As the study seeks to determine what personal and environmental factors predict the type of supported accommodation selected, a post-positivist position is taken.

Post-positivism in social science research presents an opportunity for theory to be tested, to allow an understanding of the social world. Ontologically, post-positivism retains the positivist position that reality is external; in other words, that it can be measured and studied and epistemologically, knowledge is understood as being 'objective': evidence can be provided to support a hypothesis (Phoenix et al. 2013). The difference between positivism and post-positivism occurs in how epistemology and ontology are negotiated. Post-positivism recognises it is not possible for the researcher to observe the social world in a completely value-free way, due to their own background knowledge and values (Benton and Craib 2011). Therefore, post-positivism acknowledges that research is always imperfect and fallible, and it should be guided by the best evidence which the researcher has at the time (Robson and McCartan 2016).

As in positivist research, the emphasis is on theories being tested using empirical data (Guo 2015). However, the difference is that post-positivist research does not make the same assumptions about objectivity - that theories can be confirmed or rejected by observation or measurement - but that all observations and measurements have a degree of error. Moreover, it seeks to explain situations or describe relationships (Phoenix et al. 2013; Robson and McCartan 2016). As a result, post-positivist research using quantitative methods is useful in revealing aspects of social systems and identifying relationships in order to understand complexity (Byrne 2013).

5.1.2 Secondary data

Secondary data was selected as the most effective way to identify personal and environmental factors that predict moving from high support to supported housing and floating outreach-supported accommodation for people with serious mental illness. The advantage of secondary data is that it enables access to larger amounts of data than could be collected if primary data collection was undertaken (Vartanian 2011). It also enables data on larger samples of the target population to be analysed; this data is usually of better quality (Boo and Froelicher 2013). As a result, there is a reduction in perceived harm and ethical considerations; data about a population, rather than direct participant recruitment, is used (Doolan and Froelicher 2009). The benefits for the researcher include reduced costs and time involved in accessing large datasets (Vartanian 2011).

The disadvantages include lack of control over how data has been collected and how accurate it is. Large datasets can create additional biases and methodological concerns (Vartanian 2011); while missing data can have a significant effect on the reliability and validity of results from the analysis (Magee et al. 2006; Okafor et al. 2016). When datasets are linked, stable and sufficiently unique identifiers are required to link data accurately (Bohensky 2011).

To answer the research question, the researcher aimed to source data that provided the best conceptual representation of personal and environmental factors encountered in supported accommodation for people with serious mental illness. While an extensive search was made to find suitable datasets, only two datasets were identified that included data on the study population and contextual factors within supported accommodation. These two datasets, the Scottish Morbidity Record – Scottish Mental Health and Inpatient Day Case Section (SMR04), and the Scottish Government Social Care Survey (SGSCS), are described below.

5.1.3 Identified datasets

Scottish Morbidity Record – Scottish Mental Health and Inpatient Day Case Section (SMR04).

SMRO4 is collected by the Information Services Division (ISD) of NHS National Services Scotland (NHS NSS). It is a national dataset which collects episode level data on patients receiving care at psychiatric hospitals at the point of both admission

and discharge. The dataset contains a wide variety of information such as patient characteristics, mental health diagnosis, length of stay, destination on discharge, whether they are admitted under mental health legislation, and any previous psychiatric care. Patient identifiers such as name, date of birth, Community Health Index number, NHS number and postcode are included, together with a wide variety of geographical measures. Approximately 21,000 records are added annually, with 99% of CHI numbers complete.

The dataset was identified as appropriate for the research as it includes data linked to personal and environmental factors. ISD completeness estimates for the selected years show that in 2014/15, undercounting was estimated to have reduced the Scotland total by around 2% (Information Services Division 2016); and in 2015/16, by around 3% (Information Services Division 2017). In both periods, ISD considered this a small effect, so no attempt was made to correct the data for these years.

Scottish Government Social Care Survey (SGSCS)

The SGSCS is a census of home care services provided or purchased by Scottish local authorities. From 1998 onwards, local authorities were asked to provide details of all home care services provided by their own staff, as well as services bought in from other local authorities, private and voluntary organisations. Information on client age, level and type of service provided, was introduced to the collection in 2005. A revised social care statistical collection was introduced in 2013, which incorporated the previously separate Self-Directed Support/Direct Payments Survey into the Home Care Census. Information was collected on an individual basis for each home care client receiving home help, meals and community alarm/telecare services, as well as for clients receiving direct payments.

In Scotland, the Social Care (Self-directed Support) (Scotland) Act was implemented in April 2014. The SDS Act places the requirement for local authorities to provide all assessed care in the form of SDS (Pearson et al. 2018). A person has four options regarding how SDS can be managed;

1. SDS Option 1: Direct payment is where a person is given money by the local authority to arrange their own services. The individual is in complete control of how the money is spent.

2. SDS Option 2: An individual chooses the provider and then the council pays the provider. The council holds the budget and the person is in charge of how it is spent
3. SDS Option 3: An individual chooses to allow the council to arrange and determine their service
4. SDS Option 4: An individual chooses a mix of options for different types of support.

The summary report of the SDS rollout in Scotland for 2015-16 (Scottish Government 2017b), corresponding to the data used in the analysis, presented collated information on all clients who made a choice regarding their services or support at any time during the 2015-16 financial year. 4% of people were recorded as having a mental illness by the summary report.

5.2 Analysis

5.2.1 Study Sample

Data was linked for the years 2013/14, 2014/15 and 2015/16 to ensure that the SGSCS dataset included data on people with serious mental illness receiving SDS. Data was linked by the National Record Scotland (NRS) indexing team, using identified linkage variables (Community Health Index (CHI) number and postcodes). Linking was carried out using a calibrated optimal method (NRS 2017), which generated 5016 linked cases with 29 tied IDs (where more than one case links to the spine ID). The accuracy of the linkage was 99%. The removal of tied IDs was completed as part of the data cleaning process. All linking information was removed from the dataset and unique identifiers generated for analysis purposes prior to it being moved into the NSS Safe Haven. This meant that each individual identified across both datasets had a unique identifier allocated to their information in each dataset, allowing the candidate to apply inclusion criteria to address each research question. The data linking process and application of inclusion criteria is represented in Figure 5. The researcher only had access to the linked data once it had been moved into the NSS Safe Haven. This process is discussed further as part of ethical considerations for the study (see Section 5.3.2).

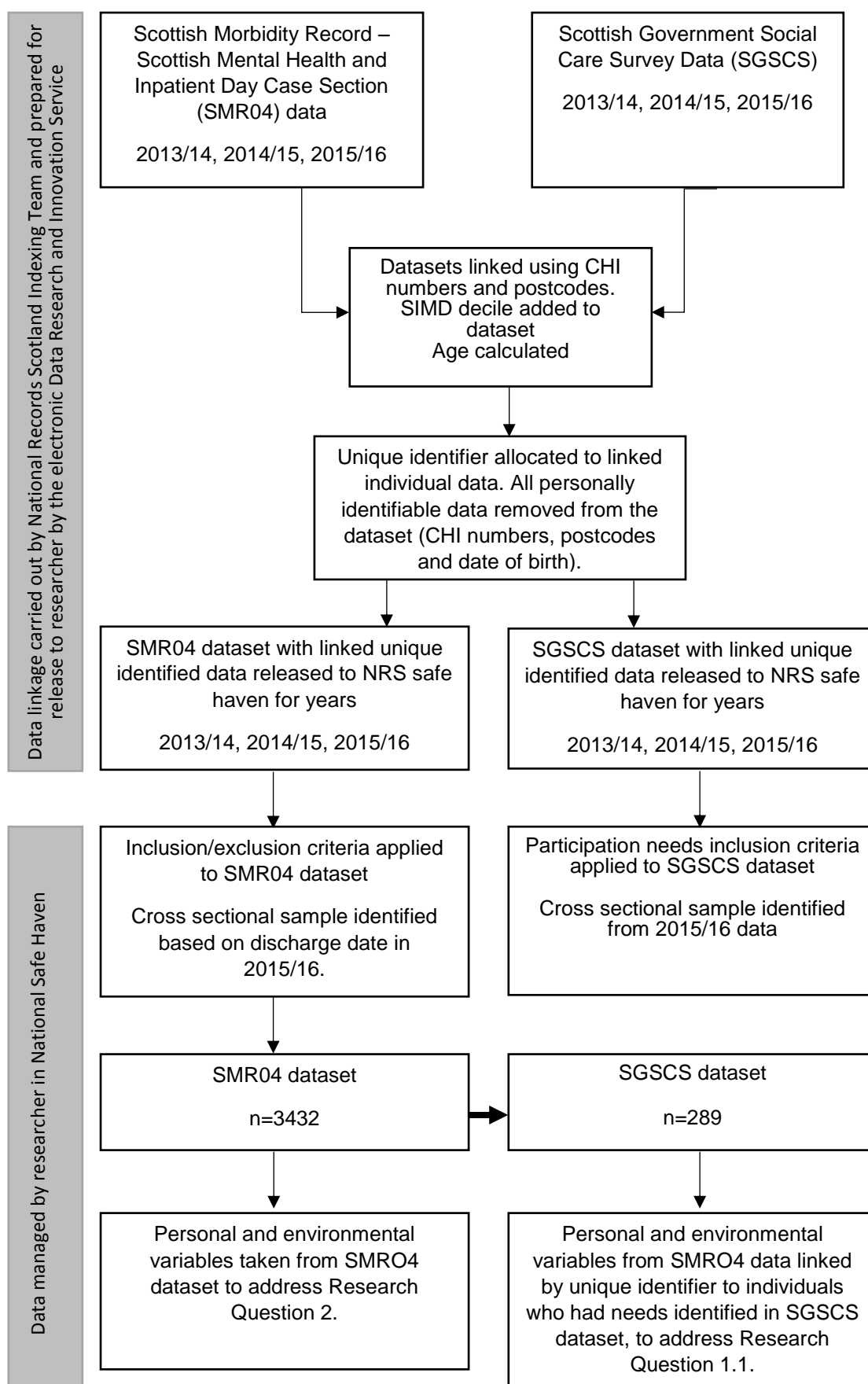


Figure 5: Data linking process

5.3 Ethical considerations

5.3.1 Ethical approval

The research was approved by the Queen Margaret University Ethics Committee (see Appendix 7), who referred it for external review. The NHS Scientific Officer confirmed that NHS ethical review was not required for the study, as no patient identifiable information was used. An application to the Public Benefit and Privacy Panel (PBPP), a governance structure of NHS Scotland which scrutinises information governance issues relating to use of NHS Scotland data for research, was submitted. A Privacy Impact Assessment (PIA) was submitted to the Scottish government. A PIA was identified as necessary because the researcher had not previously had access to the information analysed, which involves the health records of individuals, thereby raising privacy concerns. Approval was received for the linking of the identified data points from the two datasets (Appendix 8).

A Data-sharing Agreement was issued to confirm the sharing and handling of data for the study. An eDRIS Service User Agreement was also completed by the researcher, detailing individual responsibilities related to data access and management.

5.3.2 Ethical considerations

The following ethical considerations are discussed in relation to the use of and access to secondary data from two large national datasets: handling, processing and access to data, the responsibility of the researcher to use data and create outputs that protect against the identification of an individual's personal details or identifiable characteristics, and issues related to consent.

Handling, processing and access to data

A single anonymised data extract was generated from the two datasets by the National Record Scotland (NRS) indexing team, using identified linkage variables (CHI number; postcodes: see Figure 7: data flow process). Linking was carried out using a calibrated optimal method (NRS 2017), which generated 5016 linked cases with 29 tied IDs (where more than one case links to the spine ID). The accuracy of the linkage was 99%. The removal of tied IDs was completed as part of the data cleaning process. All linking information was removed from the dataset and unique identifiers generated for analysis purposes, prior to it being moved into the NSS Safe Haven.

The researcher had access to the data via secure remote access to the NSS Safe Haven Secure, agreed as part of the PBPP approval. All data analysis generated to report study outcomes was reviewed and approved by the eDRIS Research Coordinator to ensure that original dataset material or identifiable material was not removed from the NSS Safe Haven. The linked dataset will be stored in the NSS Safe Haven for five years, and destroyed at that time, according to NSS Safe Haven guidelines.

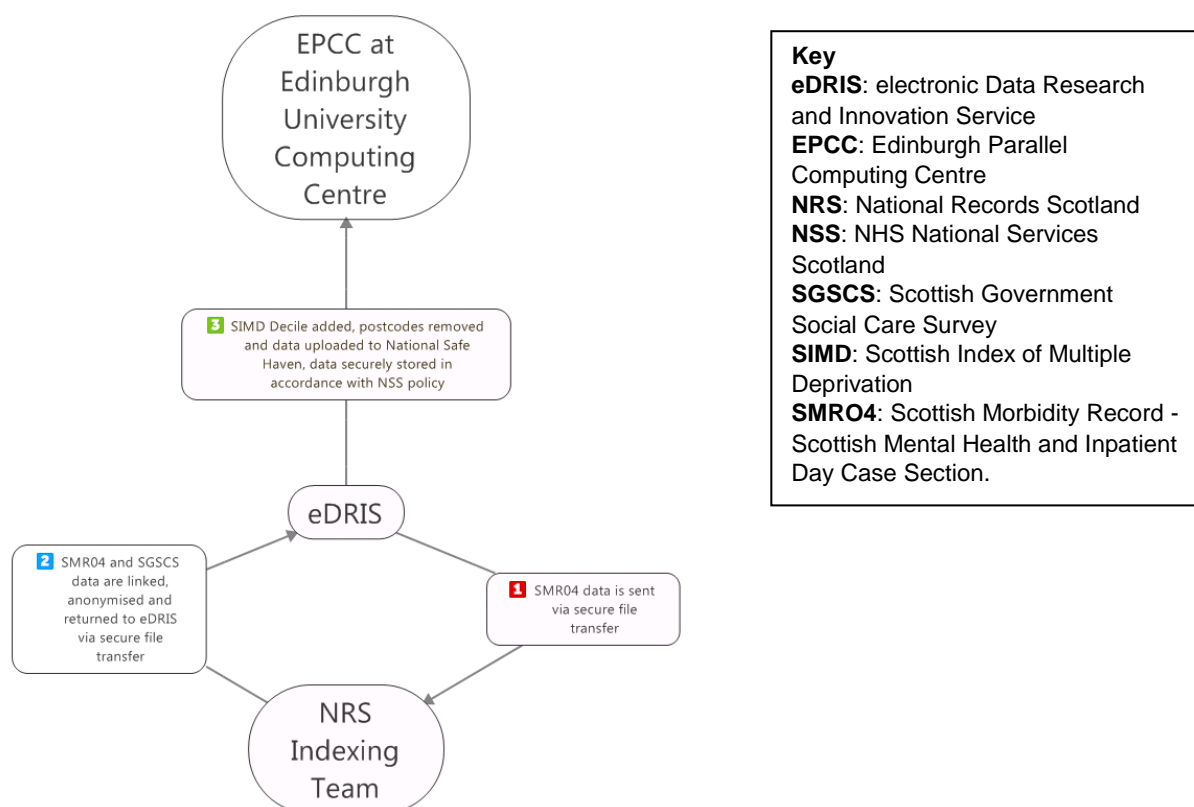


Figure 6: Data flow process

Data processing

All data processed as part of this research was used in accordance with the Caldicott and Data Protection Principles (Data Protection Act, 1998). Without the sensitive, personal data in these datasets, the researcher would be unable to determine relationships between environmental factors and outcomes for individuals with serious mental illness. Therefore, the following Data Protection Schedule conditions were identified as relevant in the PBPP:

Schedule 2:

- Condition 6 (1): The processing is necessary for the purposes of legitimate interests pursued by the data controller or by the third parties to whom the data is disclosed, except where the processing is unwarranted in any particular case by reason of prejudice to the rights and freedoms of legitimate interests of the data subject.

Schedule 3:

- Condition 8 (1): The processing is necessary for medical purposes and is undertaken by

b) A person who in the circumstances owes a duty of confidence which is equivalent to that which would arise if that person were a health professional

(2) In this paragraph, 'medical purposes' includes the purposes of preventative medicine, medical diagnosis, medical research, the provision of care and treatment and the management of healthcare services.

The applicant will be subject to the procedures outlined in the NSS eDRIS User Agreement, which seeks to prevent breaches in accordance with NSS policy or the principles of the Data Protection Act (1998).

Any breach of access to data as detailed in the eDRIS user agreement for use of the national safe haven would be reported immediately to eDRIS and the data controllers will be notified immediately if there is any breach.

Access to data

In accordance with the Scottish Government Health, Social Care and Housing – Data Linkage Project Procedures as detailed in the Privacy Impact Assessment, information was only shared when an agreement had been made between the data controller and the NRS indexing team, which upheld the secure transfer principles and physical controls as necessitated by the Data Protection Act (1988). Data from the SMR04 dataset held by Information Services Division (ISD) Scotland was provided to the National Records Scotland (NRS) indexing team through secure file transfer, in accordance with all physical controls and file transfer protocols as necessitated by the ISD data retention guidelines and with the Data Protection Act (1998).

The linked data was anonymised and not transferred to the researcher; but was available for viewing and analysis in the National Safe Haven. Data transfer only occurred once PBPP and Scottish government permission was received. The analysis of the data in the Safe Haven ensured that the researcher conformed to disclosure control procedures, by avoiding identification of groups or specific individuals, and avoiding the use of small geographical areas, with published results focusing on aggregate data. The ISD disclosure control policy was applied by the researcher in their analysis and ensured by the eDRIS coordinator, who monitored and approved all outputs. All publication of data in relation to the research and future publications has been, and will be, approved by the eDRIS coordinator in association with ISD disclosure control policy.

Use of personally identifiable characteristics

The datasets included some personally identifiable data, used to link the datasets (CHI number and postcodes) and investigate whether personal factors (ethnicity and marital status) or admission and discharge dates had an impact on participation. A patient's CHI number and individual postcodes are potentially identifiable and were used for processing only. The CHI number was used to link the two datasets; the postcodes were used to identify the level of deprivation in deciles for each individual. These variables were removed before the data was transferred to the National Safe Haven, where the researcher had access to the final linked dataset. This process ensured that confidentiality was upheld where possible.

Marital status and ethnic group were considered important to investigate at an aggregate level to determine whether differences between individuals with different marital status exist, and explore the effect of relationships on participation. The research investigated several relationships that required knowledge of the full dates of individual admissions and discharges, as recorded in the SMR04. Having access to these dates enabled the researcher to calculate the length of inpatient stay. The researcher also intended to investigate which contextual factors were present at the time of hospitalisation, based on knowledge of the census date of the SGSCS and changes in contextual factors across individuals with multiple admissions. However, due to the number of people with mental illness identified in the dataset as receiving SDS, the impact of multiple admissions was not investigated in this study. The previous psychiatric care variable was used as a predictor variable in the supplementary analysis.

Consent

Secondary data falls under information governance principles, suggesting that individuals need not be contacted (Data Protection Act 1998). As the results of the research were anonymised, no direct implications were anticipated for the individuals whose data was analysed. Participants have not given express consent for their data to be used as part of the study, and it is not appropriate to identify and ask participants to give their expressed consent. Procedural mechanisms were in place when the data was originally collected; the individuals were made aware of this. This is detailed below for each organisation.

Patients in the NHS are informed about the storage of their health records via the NHS inform website. This gives information on the types of records which the NHS holds on patients, how they are stored, and the rights which patients have in accessing them. The confidentiality of this information is highlighted, as well as the patient's rights and responsibilities in accordance with keeping this information safe.

The responsibilities of the NHS are also stipulated, which include the protocol for sharing information with researchers. The NHS Confidentiality Factsheet (NHS Inform) highlights that information may be used for research purposes and is sometimes shared by the NHS when this contributes to the greater good, provided that the patient has provided consent or not objected when informed that their information will be shared. Patients can state they do not want their information to be shared; if so, the NHS will attempt to limit this as much as possible. The document also explains that these processes are in accordance with the Data Protection Act (1998) and the Charter of Patient Rights and Responsibilities (2012), with the latter summarising rights as detailed in The Patient Rights (Scotland) Act (2011).

The SGSCS is collected by local authority staff and management information systems developers and support staff. This data forms part of the Health, Social Care and Housing – Data Linkage Project, aimed at improving and planning future social care, housing support and health services. The project is subject to data-sharing agreements between the local authority and the Scottish government, and is subject to privacy considerations identified through a privacy impact assessment, in accordance with the Data Protection Act (1998) and other important Acts regarding the use of personal information.

As part of this project, the Scottish government stipulated that all local authorities updated their privacy (fair processing) notices and informed individuals of how their data would be used in an accessible way, suggesting that reviews would be a good time to do this. The suggested notice stipulated that data may be used for service benefit, could be linked to other data, and that personal identifiers would be masked. These notices also made individuals aware that their data may be accessed by researchers but would not be identified where possible; and that they were able to contact the local authority or Scottish government if they had any questions.

5.4 Analysis Plan

5.4.1 Data quality

There was total data for 5,016 individuals, reflecting multiple admissions and discharges, with 4,353 unique cases in the linked dataset for people with serious mental illness within the identified years of 2013-2014, 2014-2015 and 2015-2016. Data completeness was especially an issue with the SGSCS data; a decision was made to only use data recorded in 2015-2016, as this was the most complete. However, there were still issues with missing data which affected the final sample size for inclusion in the analysis. As a result, the requested data fields included in the datasets based on identified personal and environmental factors were reduced (see Appendix 6 for data codebook). In addition, any data field with five or less recorded incidences was excluded, so that individually identifiable information was not revealed, as defined in the eDRIS user agreement (National Services Scotland 2013).

5.4.2 Inclusion criteria

Inclusion criteria were initially applied to the SMRO4 linked dataset as the primary inclusion criteria were contained in this (see Figure 5). Individuals were included in the sample for Research Question 2 and Research Question 1.1 if they:

- Were aged 18-65
- Had a diagnosis of Schizophrenia, Mood Disorder or Personality Disorder (ICD codes)
- Were living in high support, supported accommodation or floating outreach.

To address Research Question 1.1, an extra inclusion criteria was applied to identify individuals in the SGSCS sample who had the following needs identified:

- Personal Care need
- Domestic Care need
- Healthcare need
- Social, Educational, Recreational need.

Diagnostic codes from the International Classification of Diseases Version 10 (ICD-10; WHO 2001) are reported in the SMR04 dataset. The diagnostic code recorded at discharge was used to identify diagnosis (see Table 1):

Table 3: ICD 10 diagnosis group codes

ICD Codes	ICD Category name	Category name for analysis
F20-29	Schizophrenia, schizotypal and delusional disorders	Schizophrenia
F30-39	Mood (affective disorders)	Mood disorders
F60-69	Disorders of adult personality and behaviour	Personality disorders

The codes defined within these ICD-10 classifications were grouped together into categories to make the data easier to handle for analysis. Okafor et al. (2016) indicate that the use of diagnosis-related group codes is usually more accurate as it avoids any misclassification that could occur. These groups were selected as representing the range of diagnoses used for people with serious mental illness (Jacobs et al. 2015).

5.4.3 Analysis

Based on the nature of the variables in the datasets (continuous and categorical variables) and the assumptions made about the data – that a linear relationship cannot be established if there is a categorical outcome variable - the researcher modelled the variables with logistic regression modelling. Logistic and multinomial regression modelling were used to address the research questions. Logistic regression was used to determine the association between personal and environmental factors associated with QoL for people with serious mental illness living in supported housing and floating outreach-supported accommodation. Multinomial

regression was used to determine the association between personal and environmental factors for people with serious mental illness moving from high support to supported housing and floating outreach-supported accommodation in the community.

5.4.4 Regression modelling

Logistic regression can be used to examine the association between an outcome and several predictor variables, or determine how well an outcome is predicted from a group of predictor variables (Stoltzfus 2011). The aim of analysis through logistic regression modelling is to find the best fitting model to describe the relationship between an outcome variable (also known as a dependent or response variable) and one or more predictor variables (also known as independent or explanatory variables: Hosmer et al. 2013).

The principles of logistic regression build on those of linear regression. In linear regression models, continuous outcomes (those which can be meaningfully added, subtracted, multiplied, and divided) are analysed. The assumption is that the relationship between the outcome and the predictor variables follows a straight line, so that when there is a change in the predictor variable, a corresponding change is seen in the outcome variable (Stoltzfus 2011).

In linear regression, the outcome variable Y is predicted from the equation of a straight line

$$Y_i = b_0 + b_1X_{1i} + \epsilon_i$$

in which b_0 is the Y intercept, b_1 is the gradient of the straight line, X_1 is the value of the predictor variable and ϵ is a residual term. In multiple regression, where there are several predictor variables, a similar equation is created, with each predictor variable having its own coefficient. Y is therefore predicted from a combination of each predictor variable, multiplied by its respective regression coefficient:

$$Y_i = b_0 + b_1X_{1i} + b_2X_{2i} + \dots + b_nX_{ni} + \epsilon_i$$

Where b_n is the regression coefficient of the corresponding variable X_{ni} (Field et al. 2013).

In binary logistic regression, the model predicts membership of two categorical outcomes. In logistic regression, when there is only one predictor variable, X_1 , the logistic regression equation from which the probability of Y is given is

$$P(Y) = \frac{1}{1 + e^{-(b_0 + b_1 X_1)}}$$

in which $P(Y)$ is the probability of Y occurring, e is the base of natural logarithms, and the other coefficients form a linear combination similar to simple regression. The values in the brackets within the equation contain the linear regression equation, with a constant (b_0), a predictor variable (X_1) and a coefficient attached to it (b_1).

There are similarities between linear and logistic regression; however, attempting to apply linear regression to categorical outcome variables would violate the assumption of the former that the relationship between variables is linear. Logistic regression is therefore based on the principle of logarithmic transformation. The logistic regression equation expresses this in logarithmic terms (called the logit), overcoming the assumption of linearity. As a result, the value of the equation falls between 0 and 1. This contrasts with linear regression, where the value of the variables could potentially take on any number. Therefore, in logistic regression modelling, a value close to 0 means that Y is unlikely to have occurred; and a value close to 1 means that Y is very likely to have occurred.

Each predictor variable in the logistic regression equation has its own coefficient. Analysis includes estimation of the value of the coefficients; these parameters are estimated by fitting models, based on the available predictor variables, to the observed data. The values of parameters are estimated using maximum-likelihood estimation, which selects coefficients that make the observed values more likely to have occurred (Field et al. 2013).

5.4.4.1 Measuring the fit of the model

In logistic regression, the observed and predicted values are used to assess the fit of the model, using the measure of log-likelihood. It is based on summing the probabilities associated with the predicted and actual outcomes. Large values of the

log-likelihood statistic indicate more unexplained observations resulting in a poorly fitting model. The deviance statistic is related to the log-likelihood and given by
 $\text{deviance} = -2 \times \text{log-likelihood}$ or $-2LL$.

5.4.4.2 Interpretation of logistic regression

The value of the odds ratio is important in interpreting the logistic regression. The odds ratio is the exponential of B and an indicator of the change in the odds as a result of a unit change in the predictor variable. The odds of an event occurring are defined as the probability of an event occurring divided by the probability of the event not occurring. The odds ratio represents the proportionate change in odds, so if the value is greater than 1, then it indicates that as the predictor variable increases, the odds of the outcome occurring increase. A value less than 1 indicates that as the predictor variable increases, the odds of the outcome occurring decrease.

5.4.4.3 Multinomial regression

Multinomial regression is a modification of the logistic regression model which accommodates an outcome that has more than two categories. It estimates the probability of choosing each of the categories, as well as estimating the odds of the category choice as a function of the covariates, expressing the results in terms of odds ratios for a choice of different categories (Hosmer et al. 2013). For example, if there are three outcome categories, A, B and C, the analysis will consist of two comparisons: for example, A vs B and A vs C. The form this comparison takes needs to be specified, so a baseline category has to be selected (Field et al. 2013).

The benefit of running a multinomial regression as opposed to binary regression models is that categories are estimated simultaneously, meaning the parameter estimates are more efficient, resulting in less overall unexplained error. Sample size guidelines for multinomial logistic regression indicate a minimum of 10 cases per independent variable (Starkweather and Moske 2011). For the purpose of answering Research Question 1, the aim was to understand which predictor variables were associated with discharge to supported housing and floating outreach, meaning that the multinomial regression compared High Support vs Supported Housing and High Support vs Floating Outreach.

5.4.4.4 Constructing the models: general considerations

Number of predictor variables fitted to models

An important consideration when selecting predictor variables to fit a logistic regression model relates to how large a sample is required to ensure that the resulting model is not overfitted. An overfitting model results in an unstable model, which cannot be reliably used to predict outcomes. The usual rule applied for logistic regression modelling is 10 events per variable (Peduzzi et al. 1996; Vittinghoff and McCulloch 2006).

Sample balance

In logistic regression, it is considered important that samples represent the population being studied, rather than samples being matched, which can introduce sampling bias (Crone and Finlay 2012). This enables predictor variables to be included that are relevant to the population being studied (King and Zeng 2001). For all models, there were greater numbers of people categorised as having schizophrenia and previous psychiatric care. However, no adjustment was made to balance these variables, as they replicate participant populations in previous studies (de Heer-Wunderink 2012; Lambri et al. 2012; Killaspy et al. 2016 (b)).

Entry of predictor variables into model

A forced entry method was used for the multinomial model. This is when all the predictor variables are placed in the model in one block and estimate parameters for each predictor variable. For the logistic regressions, a backward stepwise method was used. In this modelling approach, all predictor variables are fitted into the model first. Then stepwise removal of non-significant variables is completed; and as each predictor variable is removed, the model is refitted until only those predictor variables that make a significant contribution to the model remain (Stoltzfus, 2011). As the researcher was using R, they, rather than the analysis package, decided which predictor variables were removed from the model, based on whether they were non-significant and their significance as previously reported in research related to supported accommodation.

Evaluating the models: assumption testing

There are four assumptions for logistic regression:

- Linearity: there is a linear relationship between continuous predictor variables and the logit of the outcome variable.
- Multicollinearity: predictor variables should not be highly correlated.
- There are no influential cases (outliers).
- Independence of errors: cases of data are not related. In other words, all values of the outcome variable are independent; they come from a separate entity.

Goodness of fit

Observed and predicted values are used to assess the fit of the model, using the log-likelihood. The log-likelihood is based on summing the probabilities associated with the predicted and actual outcomes; and is an indicator of how much unexplained information there is after the model has been fitted. Large values of the log-likelihood statistic indicate poorly fitting models.

Casewise diagnostics in logistic regression

Residual variables are examined to see how well the model fits the observed data. Examining the studentised residuals, standardised residuals and deviance statistics identifies points where the model fits poorly. DFBeta and leverage statistics can be used to examine whether any outliers have an undue influence on the model (Field et al. 2013).

Multicollinearity

Multicollinearity exists when there is a strong correlation between two or more predictor variables in a model. The variance inflation factor (VIF) is calculated to establish whether a predictor variable has a strong linear relationship with the other predictor variables. A value of 10 is recommended as that which to be concerned about multicollinearity. The tolerance statistic is related to the VIF and is its reciprocal ($1/VIF$). Values less than 0.1 indicate serious problems (Field et al. 2013).

Linearity of the logit

The assumption is that there is linearity of the predictor variables and log odds. Testing the linearity of the logit therefore checks that each of the continuous variables is linearly related to the log of the outcome variable. To test for linearity of the logit, the logistic regression is run and includes predictor variables that are the interaction

of the predictor variable and the log of itself. The interaction terms of each of the variables is created with its log. If the interaction term is $>.05$, then the assumption of linearity of the logit is met.

Identifying significant variables

Pearson's chi-square test was used to establish whether there was a relationship between categorical variables before inputting into the logistic regression models. Two assumptions need to be met when using a chi-square test with categorical data. Each item contributes to only one cell of the contingency table, which means a chi-square test cannot be used on a repeated measure design and the expected frequencies should be greater than 5, as this can reduce statistical power. Field et al. (2013) also note the importance of observing row and column percentages to interpret any effects generated, as proportionately small differences in cell frequencies can result in statistically significant associations between variables if the sample is large enough. In R, the gmodels package and CrossTable function were used to generate contingency tables. Univariable analysis was used to assess the significance of variables against the baseline model for the multinomial data.

6 Results

A significant number of people with serious mental illness continue to have long stays in high support accommodation, which can increase their dependence on services and limit their recovery - as there are often less opportunities for participation in daily living and social activities in these environments (Dickinson et al. 2002; Loch 2014). Moving into supported accommodation environments which have less support, enable people to develop living skills and have increasing choice about how they live their lives, is important if their recovery is to be supported.

Understanding the factors that predict moving into these types of accommodation is important to support provision of recovery-orientated services (Merryman and Riegel 2007; Petersen et al. 2015). Research Question 2 addressed what factors predict moving from high support to supported housing and floating outreach-supported accommodation for people with serious mental illness.

A review of the secondary datasets showed that QoL outcomes were not included in the data. Although the datasets did not report QoL outcomes, items were available on Personal Care, Domestic Care, Healthcare, and Social, Educational and Recreational Needs identified by individuals. A supplementary analysis was run to determine what personal and environmental factors predicted the identification of Personal Care, Domestic Care, Healthcare, Social, Educational and Recreational Needs by people with serious mental illness.

This results chapter is structured around the findings for Research Question 2 and supplementary Research Question 1.1.

6.1 Research Question 2:

What factors predict moving from high support to supported housing and floating outreach-supported accommodation for people with serious mental illness?

The multinomial modelling tested a null hypothesis that the independent (predictor) variables (personal and environmental factors) are unrelated to the dependent (outcome) variable (supported accommodation type).

6.1.1 Summary of the model

A multinomial regression model was developed, which looked at the personal and environmental factors associated with accommodation type at discharge from high support accommodation (see Table 4).

Table 4: Predictor variables for multinomial modelling

Model	Outcome variable	Predictor variables
1.	High Support Supported Housing Floating Outreach	Personal Age, Gender, Diagnosis Environmental Length of Stay, Previous Psychiatric Care, Legal Status at Admission.
2.	High Support Supported Housing Floating outreach	Personal Age, Diagnosis Environmental Length of Stay, Legal Status at Admission.

Analysis was performed in R version 3.5. (R Core Team 2013). The researcher completed online courses, utilised statistics books and open access R resources available online to develop skills and knowledge regarding completing all aspects of data management and analysis using R. The researcher completed the multinomial regression analysis using the mlogit package. The dataset was reformatted to allow multinomial regression to be carried out. A data frame was created using the mlogit.data function, with one row per unique ID per category of the outcome variable. Each row contains either TRUE if the unique ID was assigned to that category, or FALSE if it was not (Field et al. 2013).

6.1.1.1 Treatment of predictor variables

The discussion of treatment of predictor variables will be split into personal and environment variables. The data codebook provides further details of how variables were identified from the two datasets (Appendix 6).

6.1.1.2 Personal factors

Age was entered as a continuous variable. Gender was entered as a categorical variable consisting of two categories (male/female) as reported in the SMR04 data. Diagnosis was entered as a categorical variable consisting of three categories (schizophrenia; mood disorders; personality disorders).

6.1.1.3 Environmental factors

Length of stay was entered as a continuous variable. Previous Psychiatric Care was entered as a categorical variable consisting of two categories (yes/no) Legal status at admission was entered as a categorical variable with two categories (3=formal/4=informal).

The baseline category for categorical variables within R was organised as follows (see Table 5):

Table 5: Baseline categorical variables for multinomial regression

Variable	Baseline category
Outcome variable	High Support
Predictor variables	
Gender	Male
Diagnosis	Mood Disorder
Previous psychiatric care	No
Legal status	Informal

The baseline category for the outcome variable was set to High Support, as the model was identifying the personal and environmental factors that affected people with serious mental illness moving to other types of supported accommodation. The decision regarding baseline category for the predictor variables was based on previous research (Jacobs et al. 2015).

6.1.1.4 Excluded variables

The ethnicity variable was excluded due to the small proportion of black and minority ethnic groups recorded in the total sample, which risked revealing personally identifiable information (National Services Scotland, 2013).

6.1.2 Findings

The findings are structured as first presenting demographic information on the sample, then moving onto an explanation of model-building, followed by presentation of the model results.

6.1.2.1 Sample characteristics

The data was created from the SMR04 dataset. A cross-sectional approach was taken, with the last discharge date for the 4950 unique IDs in the dataset used to create the initial sample. After applying the diagnostic inclusion criteria to the sample, the final sample size was n=3432.

The demographic characteristics are shown in Table 7 for the sample in each of the supported accommodation types. The schizophrenia diagnostic category has the highest percentage across all three supported accommodation types. There is a higher percentage of men in high support (58%) and supported accommodation (66%). The median length of stay was highest in supported housing (178 days). The majority of the sample across the three supported accommodation types had a previous admission to hospital.

Table 6: Characteristics of sample in multinomial modelling

	High Support	Supported Housing	Floating Outreach
	N=274	N=301	N =2857
Personal factors			
Age (range 18-65)	Mean: 43.57 Median: 44	Mean: 45.21 Median: 47	Mean: 44.24 Median: 45
<i>Gender</i>			
Male	58%	61%	50.1%
Female	42%	39%	49.9%
<i>Diagnosis</i>			
Mood disorders	25%	15%	36%
Schizophrenia	65%	77%	49%
Personality disorders	10%	8%	15%
Length of stay in hospital	Mean: 232.3 days Median: 48 days	Mean: 482.7days Median: 178 days	Mean: 72.9days Median: 26 days
<i>Legal environment</i>			
Legal status at admission			
Formal	49%	57%	27%
Informal	51%	43%	73%
Previous psychiatric care			
Yes	88%	91%	84%
No	12%	9%	16%

6.1.3 Construction of the model

Six predictor variables (four categorical and two continuous) were fitted in the multinomial model. The response variable was High Support compared to Supported Housing, and High Support compared with Floating Outreach. The forced entry method was used, where all predictor variables were fitted in the model in one block, thereby estimating parameters for each predictor variable. The model was fitted on the sample as a whole. A decision was made not to explore the significance of individual predictor variables prior to fitting the model due to the large sample size, which did not subvert the ten events per variable rule, which is also applicable in multinomial regression.

Following the fitting of the first model, a second model was fitted, excluding predictor variables that were non-significant (Gender and Previous Psychiatric Care). Results of the first model fitted are presented in Table 7, with those of the second model fitted set out in Table 8. The effects of each supported accommodation type - high support compared to supported housing and high support compared to floating outreach - will be discussed separately.

Table 7: Multinomial model 1

			High Support vs Supported Housing					High Support vs Floating Outreach	
		95% CI for odds ratio					95% CI for odds ratio		
	B (SE)	Lower	Odds ratio	Upper		B(SE)	Lower	Odds ratio	Upper
Constant	-2.28*** (0.67)	0.03	0.10	0.38		2.47*** (0.45)	4.84	11.82	28.84
Age	0.04*** (0.01)	1.02	1.04	1.06		0.01 (0.01)	0.99	1.01	1.02
Gender									
Female ¹	-0.13 (0.27)	0.51	0.87	1.49		0.27 (0.21)	0.88	1.31	1.97
Diagnosis									
Schizophrenia ²	1.06** (0.34)	1.48	2.88	5.61		-0.05 (0.24)	0.60	0.95	1.51
Personality disorder ²	0.43 (0.52)	0.56	1.54	4.24		-0.10 (0.35)	0.46	0.90	1.78
Length of stay	0.001** (0.0003)	1.00	1.00	1.00		-0.002*** (-0.0003)	1.00	1.00	1.00
Legal status at admission									
Formal ³	-1.15*** (0.27)	0.19	0.32	0.53		-1.03*** (0.20)	0.24	0.36	0.53
Previous psychiatric care									
Yes ⁴	0.36 (0.38)	0.68	1.44	3.04		0.33 (0.26)	0.83	1.39	2.31

¹Gender compared to male; ²Diagnosis compared to Mood Disorders; ³ Compared to informal legal status at admission; ⁴ Compared to Previous Psychiatric Care: No

*** p< .001, ** p<.01 , * p< .05 Log-Likelihood: -828.03; McFadden R²: 0.13226; Likelihood ratio test : chisq = 252.41 (p.value = < .00)

Table 8: Multinomial Model 2

			High Support vs Supported Housing					High Support vs Floating Outreach	
		95% CI for odds ratio					95% CI for odds ratio		
	B (SE)	Lower	Odds ratio	Upper		B(SE)	Lower	Odds ratio	Upper
Constant	-2.06*** (0.61)	0.04	0.13	0.42		2.77*** (0.42)	6.98	16.03	36.8
Age	0.04*** (0.01)	1.02	1.04	1.06		0.01 (0.01)	1.00	1.01	1.02
Diagnosis									
Schizophrenia ¹	1.11*** (0.33)	1.58	3.04	5.84		-0.06 (0.23)	0.6	0.94	1.49
Personality disorder ¹	0.44 (0.51)	0.57	1.56	4.24		0.01 (0.34)	0.52	1.01	1.96
Length of stay	0.001** (0.0003)	1.00	1.00	1.00		-0.002*** (0.0003)	1.00	1.00	1.00
Legal status at admission									
Formal ²	-1.14*** (0.27)	0.19	0.32	0.54		-1.03*** (0.20)	0.24	0.36	0.52

¹Diagnosis compared to Mood Disorders ² Compared to informal legal status at admission

*** p< .001, ** p<.01 , * p< .05

Log-Likelihood: -831.46, McFadden R²: 0.12866 , Likelihood ratio test : chisq = 245.55 (p.value = < .00)

6.1.4 Results from fitting the multinomial model

6.1.4.1 Supported Housing compared to High Support

Significant results for discharge to supported housing compared to high support were found for age, a diagnosis of schizophrenia, length of stay, and a formal admission to hospital. Increasing age was associated with whether someone moved to supported housing ($b = 0.04$, $p < .001$). For every year's increase in age, the chance of moving into supported housing rather than moving to high support accommodation at discharge increased by 1%. Having a diagnosis of schizophrenia affected whether someone moved to supported housing ($b = 1.11$, $p < .001$). The chance of someone with a diagnosis of schizophrenia moving to supported housing was 204% more than for them moving to high support accommodation. Formal admission to hospital reduced a person's chance of moving to supported housing by 68%, compared to moving to high support accommodation. While longer stays in hospital were significant ($b = 0.001$, $p < .001$), they did not have an effect on whether people moved to supported accommodation.

6.1.4.2 Floating Outreach compared to High Support

Significant results for discharge to floating outreach compared to high support accommodation were found for length of stay and formal admission. Formal admission to hospital significantly affected whether someone moved to floating outreach ($b = -1.03$, $p < .001$). Formal admission reduced someone's chance of moving to floating outreach by 64% compared to moving to high support accommodation. While longer stays in hospital were significant ($b = -0.002$, $p < .001$), they did not have an effect on whether people moved to supported floating outreach.

6.1.4.3 Model fit

A second model was fitted for the data, excluding the predictor variables gender and previous psychiatric care. The results showed there was little change in which predictor variables were significant across both models. Model 1 (Table 8) had a slightly higher chi-square test ($\text{chisq} = 252.41$ ($p\text{-value} = < .00$)). The McFadden R^2 is 0.13226 for Model 1 as compared to 0.12866 for Model 2 (see Table 9). This indicates that both models were a moderate fit for the data; it was decided that Model 1 (Table 8) was the better fit.

Linearity was assessed for Model 1 and showed that the log of Length of Stay for supported accommodation was 0.99, and the log of Age was 0.57, both of which are greater than .05; therefore, the linearity of the logit was met. The log of Length of Stay for floating outreach was 0.004, which is less than .05; therefore, the linearity of the logit was not met. Collinearity was assessed; the VIF and its residual $1/\text{VIF}$ for all exploratory variables showed that multicollinearity did not affect the model, as none of the values were greater than 10.

6.2 Research Question 1.1

What factors predict the identification of Personal Care, Domestic Care, Healthcare and Social, Educational and Recreational needs of people with serious mental illness?

A supplementary analysis was run to determine what personal and environmental factors predicted the identification of Personal Care, Domestic Care, Healthcare, Social, Educational and Recreational Needs of people with serious mental illness. These needs are identified as part of the SDS assessment to inform a shared decision-making process, to ensure that people have choice about identifying what needs they have and control over how these are met.

The supplementary research question addressed by the logistic regressions was:

What personal and environmental factors predict the needs of people living in supported housing and floating outreach accommodation?

The logistic regression modelling tested a null hypothesis that the independent (predictor) variables (personal and environmental factors) are unrelated to the dependent (outcome) variable (need identified).

6.2.1 Summary of model

Binary logistic regression was run in R using the glm function, for each of the identified needs: Personal Care Need, Domestic Need, Healthcare Need, Social, Educational and Recreational Need (see Table 4):

Table 9: Predictor variables for logistic regression models

Model	Outcome variable	Predictor variables
a. Personal Care Need	Need identified Yes/No	Personal Age, Gender, Diagnosis Environmental Housing Type, Level of Deprivation, Support Mechanism Financial Contributor, Legal Status at Admission, Length of Stay
b. Domestic Need	Need identified Yes/No	
c. Healthcare Need	Need identified Yes/No	
d. Social, Educational and Recreational Need	Need identified Yes/No	

6.2.1.1 Treatment of predictor variables

The discussion of predictor variables will be split into personal and environment variables. The data codebook provides further details of how variables were identified from the two datasets (Appendix 6).

6.2.1.2 Personal factors

Age was entered as a continuous variable. Gender was entered as a categorical variable consisting of two categories (male/female), as reported in the SMR04 data. Diagnosis was entered as a categorical variable, consisting of two categories (schizophrenia and mood disorders). The diagnostic category was reduced to accommodate the smaller sample size for modelling the factors associated with QoL for people with serious mental illness living in supported housing and floating outreach-supported accommodation.

6.2.1.3 Environmental factors

Housing type was entered as a categorical variable with two categories (Supported Housing and Floating Outreach). Level of deprivation was entered as a categorical variable with two categories (Most Deprived and Moderately Deprived). The 'least deprived' category was not entered due to the small totals in these deciles.

Support Mechanism was entered as a categorical variable of two categories (Support from Local Authority; Support from Private Provider) in all models except for the Personal Care Model, where three categories were entered (Support from Local Authority, Support from Private Provider, Support from Other Provider).

Financial contributor was entered as a categorical variable with three categories (Contribution from Social Worker, Contribution from Multiple of Sources, Contribution from Other) for the Personal Care Model; and two categories (Contribution from Social Worker, Contribution from Multiple Sources) for the other models.

Length of stay was entered as a continuous variable. Legal status at admission was entered as a categorical variable (3=formal/4=informal), as reported in the SMR04 data.

6.2.1.4 Excluded variables

A cross-sectional sample from SGSCS data from 2015-2016 was selected to address Research Question 2, as this was the most complete. As a result, the resulting

datasets were significantly reduced: only 4% of total reported numbers of people receiving SDS during 2015-2016 were people with mental illness (Scottish Government 2017). Consequently, two variables were excluded due to potentially identifiable data following univariable and contingency table analysis: Carer, and Financial Contributor.

6.3 Findings

The following presents the demographic information for the sample, an explanation of model-building, and the model results.

Four models were run in total, one for each of the needs:

- Model a: Personal care need
- Model a: Domestic care need
- Model c: Healthcare need
- Model d: Social, educational and recreational need

A cross-sectional sample was created for each need, based on the SGSCS data collected for 2015-16. A dataset was generated combining length of stay, gender, age and legal status data from the SMR04 dataset with the SGSCS variables level of deprivation, carer, support mechanism, financial contributor, and personal care need, linked by the unique ID (see Figure xx)

6.3.1 Model A: Personal care need

6.3.1.1 Sample characteristics

Demographic and variable characteristics are shown in Table 10 for the personal care need sample. The median age of the group was 48, with more males (58%) than females in the sample, and 66% of the sample having a diagnosis of schizophrenia. The majority were living in floating outreach-supported accommodation (89%), with 68% in the most deprived areas. In the social environment, only 13% were known to have an informal carer, while 41% were known to not have one. Private providers were providing support for 42% of the sample; followed by 32%, whose support was provided by the local authority. For 66% of the sample, the financial contribution to the total care package value was made by social work. 48.6% had had a length of

stay in hospital of up to one month. In the legal environment, 73% had been admitted informally to hospital at their last admission.

Table 9: Personal care need: demographic and variable information

	n =198
Personal Factors	
Age (range 18-65)	Mean: 47.19 Median: 48
Gender**	
Male	58%
Female	42%
Diagnosis*	
Mood disorders	34%
Schizophrenia	66%
Physical Environment	
Supported accommodation type**	
Floating Outreach	89%
Supported Housing	11%
Level of deprivation**	
Living in most deprived area (deciles 1-3)	68%
Living in moderately deprived area (deciles 4-6)	32%
Living in least deprived area (deciles 7-9)	*
Social Environment	
Carer*	
Known to have carer	13%
Known to not have carer	41%
Not known if have carer	46%
Support mechanism	
Support provided by local authority	32%
Support provided by private provider	42%
Support provided by other provider	26%
Financial contributor *	
Contribution from social worker	66%
Contribution from other	7%
Contribution from multiple sources	26%
Length of stay in hospital	Mean: 105.2 days Median: 32 days
Legal Environment	
Legal status at admission**	
Formal	27%
Informal	73%
SDS Need Identified	
Personal care	
Yes	24%
No	76%

***variable dropped following Pearson's chi-square test (*frequency <5 or

**variable not significant)

6.3.1.2 Construction of the initial personal care need model

Prior to fitting the initial model, Pearson's chi-square was used to identify significant categorical variables. As a result, carer and financial contributor were not included, as they included frequencies of less than 5; while gender, diagnosis, supported accommodation type, level of deprivation and legal status were dropped as they were not significant. The remaining predictor variables - support mechanism, length of stay, and age - were entered in the initial model (see Table 11). The personal care response variable was represented by 1=personal care need identified, 0=personal care need not identified.

Table 10: Initial personal care need model

	B (SE)	95% CI for odds ratio		
		Lower	Odds ratio	Upper
Constant	-2.99** (0.94)	0.01	0.05	0.29
Support from local authority	1.80*** (0.49)	2.44	6.05	16.93
Support from private provider	-0.13 (0.53)	0.31	0.87	2.59
Length of stay	0.001 (0.001)	1.00	1.00	1.00
Age	0.02 (0.02)	0.99	1.02	1.06

Model $\chi^2(4) = 30.53$, $p < .001$

*** $p < .001$, ** $p < .01$

The model showed that only support from the local authority was significant ($b=1.80$, $p < .001$). Backward stepwise regression, where Length of Stay and then Age were removed, created the final model (see Table 12).

Table 11: Final personal care need model.

	B (SE)	95% CI for odds ratio		
		Lower	Odds ratio	Upper
Constant	-1.79*** (0.41)	0.07	0.17	0.35
Support from local authority	1.76*** (0.48)	2.39	5.82	15.88
Support from private provider	-0.10 (0.52)	0.33	0.90	2.62

Model $\chi^2(2) = 28.28$, $p < .001$

*** $p < .001$

This resulted in a model where only Support from Local Authority was significant. This showed there was 482% more chance of an individual identifying a personal care need if they were supported by the local authority than by a private provider. The final model was selected after comparing it with that which included both support mechanism and age by finding the difference in the deviance statistics. This showed that the p-value was $>.05$, meaning that the model with age included was not a significant improvement over the final model.

6.3.1.3 Model fit

Linearity did not need to be tested as there were no continuous variables in the final Personal Care Model; and as there was only one variable, collinearity did not need to be explored. Examining residuals for the model confirmed that no influential cases were identified. There were no cases where standardised or studentised residuals ± 1.96 , and DFBeta <1 . The expected leverage for the model was 0.01; no cases were greater than twice the leverage.

6.3.2 Model B. Domestic care need

6.3.2.1 Sample characteristics

Demographic and variable characteristics are shown in Table 13 for the domestic care sample. The median age of the group was 49, with more males (57%) than females; and 69% of the sample having a diagnosis of schizophrenia. The majority were living in floating outreach accommodation (89%), with 72% in the most deprived areas. In the social environment, only 10% were known to have an informal carer, while 46% were known to not have one. Private providers were providing support for 57% of the sample, with the remainder having support provided by the local authority. For 67%, the financial contribution to the total care package value was made by social work. 46.5% had had a length of stay in hospital of up to one month. In the legal environment, 70% of people had been admitted informally to hospital at their last admission.

Table 12: Domestic care need: demographic and variable information

	N =217
Personal Factors	
Age (range 18-65)	Mean: 47.97 Median: 49
Gender**	
Male	57%
Female	43%
Diagnosis**	
Mood disorders	31%
Schizophrenia	69%
Physical Environment	
Supported accommodation type**	
Floating Outreach	89%
Supported Housing	11%
Level of deprivation**	
Living in most deprived area (deciles 1-3)	72%
Living in moderately deprived area (deciles 4-6)	28%
Living in least deprived area (deciles 7-9)	*
Social Environment	
Carer*	
Known to have carer	10%
Known to not have carer	46%
Not known if have carer	44%
Support mechanism	
Support provided by local authority	43%
Support provided by private provider	57%
Financial contributor*	
Contribution from social worker	67%
Contribution from multiple sources	33%
Length of stay in hospital	Mean: 102.4 days Median: 36 days
Legal Environment	
Legal status at admission**	
Formal	30%
Informal	70%
Need Identified	
Domestic	
Yes	30%
No	70%

*/**variable dropped following Pearson's chi-square test (*frequency <5 or

**variable not significant

6.3.2.2 Construction of the initial domestic care need model

Prior to fitting the initial model, Pearson's chi-square was used to identify significant categorical variables. As a result, Carer and Financial Contributor were not included, as they included frequencies less than 5; and Gender, Diagnosis, Supported Accommodation Type, Level of Deprivation and Legal Status were dropped, as they were not significant. The domestic care response variable was represented by 1=domestic care need identified, 0=domestic care need not identified.

The remaining variables, Support Mechanism, Length of Stay, and Age were entered into the initial model (see Table 14).

Table 13: Initial domestic care need model

	B (SE)	95% CI for odds ratio		
		Lower	Odds ratio	Upper
Constant	-0.90 (0.85)	0.07	0.40	2.11
Support from local authority	1.90*** (0.39)	3.15	6.66	14.86
Length of stay	<0.001 (0.001)	1.00	1.00	1.00
Age	-0.02 (0.02)	0.95	0.98	1.01

Model χ^2 (3) = 27.33, $p < .001$

*** $p < .001$

The model showed that only support from the local authority was significant ($b=1.90$, $p < .001$). Backward stepwise regression, where Length of Stay, then Age were removed, created the final model (see Table 15).

Table 14: Final domestic care need model

	B (SE)	95% CI for odds ratio		
		Lower	Odds ratio	Upper
Constant	-1.61 (0.27)	0.11	0.20	0.33
Support from Local Authority	1.57 (0.38)	2.30	4.82	10.44

Model χ^2 (1) = 17.68, $p < .001$

*** $p < .001$

This resulted in a model where only support from Local Authority was significant. This showed there was a 382% chance of an individual identifying a domestic care need if they were supported by the local authority than by a private provider. The final model was selected after comparing it with that which included both support mechanism and age by finding the difference in the deviance statistics. This showed that the p-value was

>.05, meaning that the model with age included was not a significant improvement over the final model.

6.3.2.3 Model fit

Linearity did not need to be tested as there were no continuous variables in the final domestic care model; and as there was only one variable, collinearity did not need to be explored. Examining residuals for the model confirmed that no influential cases were identified. There were no cases where standardised or studentised residuals were $> \pm 1.96$, and DFBeta was less than 1. The expected leverage for the model was 0.013; no cases were identified that were twice greater than the leverage.

6.3.3 Model C: Healthcare need

6.3.3.1 Sample characteristics

Demographic and variable characteristics are shown in Table 16 for the healthcare sample. The median age of the group was 49, with more males (52%) than females; 69% of the sample had a diagnosis of schizophrenia. The majority were living in floating outreach accommodation (90%); 73% in the most deprived areas. In the social environment, only 10% were known to have an informal carer, while 47% were known to not have an informal carer. Private providers were providing support for 58% of the sample, with the remainder having support provided by the local authority. For 66%, the financial contribution to the total care package value was made by social work. 47.3% had had a length of stay in hospital of up to one month. In the legal environment, 70% of people had been admitted informally to hospital at their last admission.

Table 15: Healthcare need: demographic and variable information

	N =201
Personal Factors	
Age (range 18-65)	Mean: 47.87 Median: 49
Gender**	
Male	52%
Female	48%
Diagnosis	
Mood disorders	31%
Schizophrenia	69%
Physical Environment	
Supported accommodation type**	
Floating Outreach	90%
Supported Housing	10%
Level of deprivation**	
Living in most deprived area (deciles 1-3)	73%
Living in moderately deprived area (deciles 4-6)	27%
Living in least deprived area (deciles 7-9)	*
Social Environment	
Carer*	
Known to have carer	10%
Known to not have carer	47%
Not known if have carer	43%
Support mechanism	
Support provided by local authority	42%
Support provided by private provider	58%
Financial contributor*	
Contribution from social worker	66%
Contribution from multiple sources	34%
Length of stay in hospital	Mean: 94.4 days Median: 35 days
Legal Environment	
Legal status at admission**	
Formal	30%
Informal	70%
SDS Need Identified	
Healthcare	
Yes	34%
No	66%

*/**variable dropped following Pearson's chi-square test (*frequency <5 or

**variable not significant

6.3.3.2 Construction of the initial healthcare need model

Prior to fitting the initial model, Pearson's chi-square was used to identify significant categorical variables. As a result, Carer and Financial Contributor were not included, as they included frequencies less than 5; and Gender, Supported Accommodation Type, Level of Deprivation and Legal Status were dropped, as they were not significant. The healthcare response variable was represented by 1=healthcare need identified, 0=healthcare need not identified. The remaining variables, Support Mechanism, Length of Stay and Age, were entered in the initial model (see Table 17).

Table 16: Initial healthcare need model

	B (SE)	95% CI for odds ratio		
		Lower	Odds ratio	Upper
Constant	-1.81 (1.17)	0.02	0.16	1.51
Support from local authority	2.93*** (0.52)	7.17	18.77	56.32
Age	-0.03 (0.02)	0.93	0.97	1.00
Length of stay	0.0003 (0.001)	1.00	1.00	1.00
Diagnosis: schizophrenia	1.28* (0.52)	1.33	3.60	10.52

Model $\chi^2(4) = 48.13$, $p < .001$

*** $p < .001$, * $p < .05$

The model showed that only support from the local authority ($b=1.90$, $p < .001$) and having a diagnosis of schizophrenia ($b=1.28$, $p < .05$) were significant. Backward stepwise regression, where Length of Stay, then Age were removed, created the final model (see Table 18).

Table 17: Final healthcare need model

	B (SE)	95% CI for odds ratio		
		Lower	Odds ratio	Upper
Constant	-3.37*** (0.59)	0.01	0.03	0.1
Support from local authority	2.89*** (0.51)	7.04	18.02	52.25
Diagnosis: schizophrenia	1.42** (0.51)	1.58	4.13	11.72

Model $\chi^2(2) = 45.59$, $p < .001$

*** $p < .001$, ** $p < .01$

The final model contains both Support from Local Authority ($b=2.89$, $p < .001$) and Diagnosis of Schizophrenia ($b=1.42$, $p < .01$), which are significant. The final model

was selected after comparing it with the model which included Support Mechanism, Age and Diagnosis, by determining the difference in the deviance statistics. This showed that the p-value was $>.05$, meaning that the model with age included was not a significant improvement over the final model. The final model showed that there was 1702% more chance of an individual identifying a healthcare need if they were supported by the local authority than by a private provider. Someone with a diagnosis of schizophrenia was 313% times more likely to have a healthcare need identified than someone with a mood disorder.

6.3.3.3 Model fit

Linearity did not need to be tested, as there were no continuous variables in the final healthcare model. Collinearity was assessed; the VIF (support 1.18; diagnosis 1.18) and its residual $1/\text{VIF}$ (support 0.85; diagnosis 0.85) showed that multicollinearity was not affecting the model, as neither value was greater than 10. Examining residuals for the model confirmed there were 5% of cases where the studentised residuals were $> \pm 1.96$, with 2% of cases greater than ± 2.58 . These cases were explored; no pattern was observed which would indicate that they were influencing the model, and DFBeta was less than 1. The expected leverage for the model was 0.021; no cases were within twice this value.

6.3.4 Model D. Social, Education and Recreational Need

6.3.4.1 Sample characteristics

Demographic and variable characteristics are shown in Table 19 for the social, educational and recreational need sample. The median age of the group was 49, with more males (58%) than females, and 66% of the sample having a diagnosis of schizophrenia. The majority were living in floating outreach accommodation (90%); 72% in the most deprived areas. In the social environment, only 10% were known to have an informal carer, while 46% were known to not have one. Private providers were providing support for 55% of the sample, with the remainder having support provided by the local authority. For 66%, the financial contribution to the total care package value was made by social work. 44.5% had had a length of stay in hospital of up to one month. In the legal environment, 71% of people had been admitted informally to hospital at their last admission.

Table 18: Social, educational and recreational need: demographic and variable information

	N =211
Personal Factors	
Age (range 18-65)	Mean: 47.45 Median: 49
Gender**	
Male	58%
Female	42%
Diagnosis**	
Mood disorders	34%
Schizophrenia	66%
Personality disorder	*
Physical Environment	
Supported accommodation type**	
Floating Outreach	90%
Supported Housing	10%
Level of deprivation**	
Living in most deprived area (deciles 1-3)	72%
Living in moderately deprived area (deciles 4-6)	28%
Living in least deprived area (deciles 7-9)	*
Social Environment	
Carer**	
Known to have carer	10%
Known to not have carer	46%
Not known if have carer	24%
Support mechanism	
Support provided by local authority	45%
Support provided by Private provider	55%
Financial contributor**	
Contribution from social worker	66%
Contribution from multiple sources	34%
Length of stay in hospital	Mean: 133.6 days Median: 41 days
Legal Environment	
Legal status at admission**	
Formal	29%
Informal	71%
SDS Support Need Identified	
Social, educational and recreational	
Yes	28%
No	72%

*/**variable dropped following Pearson's chi-square test (*frequency <5 or

**variable not significant

6.3.4.2 Construction of the initial social, educational and recreational need model

Prior to fitting the initial model, Pearson's chi-square was used to identify significant categorical variables. As a result, Carer and Financial Contributor were not included, as they included frequencies less than 5; Gender, Diagnosis, Supported Accommodation Type, Level of Deprivation and Legal Status were dropped, as they were not significant. The social, educational and recreational response variable was represented by 1= social, educational and recreational need identified, 0= social, educational and recreational need not identified.

The remaining variables, Support Mechanism, Length of Stay and Age, were entered in the initial model (see Table 20).

Table 19: Initial social, educational and recreational need model

	B (SE)	95% CI for odds ratio		
		Lower	Odds ratio	Upper
Constant	-0.98 (0.99)	0.05	0.38	2.54
Support from local authority	2.29*** (0.48)	4.02	9.84	27.22
Age	-0.04 (0.02)	0.93	0.97	1.00
Length of stay	0.002* (0.001)	1.00	1.00	1.01

Model $\chi^2(3) = 37.29$, $p < .001$

*** $p < .001$, * $p < .05$, ' ' $p < .1$

The model showed that support from the local authority ($b=2.29$, $p < .001$) and length of stay ($b=0.002$, $p < .05$) were significant. Backward stepwise regression, where Age was removed, created the final model (see Table 21).

Table 20: Final Social, educational and recreational need model

	B (SE)	95% CI for odds ratio		
		Lower	Odds ratio	Upper
Constant	-2.66 *** (0.44)	0.03	0.7	0.15
Support from local authority	2.24*** (0.48)	3.90	9.42	25.78
Length of stay	0.002* (0.001)	1.00	1.00	1.00

Model $\chi^2(2) = 33.84$, $p < .001$

*** $p < .001$, * $p < .05$.

The final model contains both Support from Local Authority ($b=2.24$, $p<.001$) and Length of Stay ($b=0.002$, $p<.05$). This model was selected after comparing it with the initial model with age included. The difference in deviance statistics showed that the p-value was $>.05$, meaning that the model with age included was not a significant improvement over the final model. The final model showed that there was 842% more chance of an individual identifying a social, educational and recreational need if they were supported by the local authority than by a private provider. While length of stay was significant, the odds ratio indicated this had no effect on the final model.

6.3.4.3 Model fit

Linearity was assessed, and showed that the log of Length of Stay was 0.30, which is greater than .05; therefore, the linearity of the logit was met. Collinearity was assessed; the VIF (support 1.07; LOS 1.07) and its residual 1/VIF (support 0.94; diagnosis 0.94) showed that multicollinearity did not affect the model, as neither value was greater than 10. Examining residuals confirmed 5% of cases where the studentised residuals were $> \pm 1.96$, with no cases greater than ± 2.58 . These cases were explored; no pattern was observed which would indicate they were influencing the model, and DFBeta was less than 1. The expected leverage for the model was 0.020; no cases were within twice this value.

6.3.5 Summary

Significant results associated with discharge to supported housing compared with high support for people with serious mental illness were found to be age, a diagnosis of schizophrenia, length of stay, and a formal admission to hospital. For discharge to floating outreach compared to high support for people with serious mental illness, there was an association with formal admission to hospital. Significant results associated with needs of people with serious mental illness were:

- People with a diagnosis of schizophrenia were more likely to have a healthcare need identified than people with a mood disorder.
- A longer length of stay increased the likelihood of someone with serious mental illness having a social, educational or recreational need identified.
- If the person was receiving support from the Local Authority they were more likely to have a need identified than if they were receiving support from any other provider.

6.3.6 Limitations of the analysis

A brief overview of the limitations of the analysis will be presented. A more detailed discussion of the limitations of the overall study is presented in Section 7.3.

One of the limitations of logistic regression is the requirement to have adequate sample size to ensure that all predictor variables can be fitted to explore the effect on the outcome variable (Berwick et al. 2005), as this can affect the fit of the model. This was not an issue for the multinomial regression models fitted to identify the predictors of placement in supported accommodation, however greater consideration of predictor variables for inclusion in the regression modelling related to needs identified by people with serious mental illness was required due to the smaller sample available.

Logistic regression modelling is also reliant on the researcher making decisions regarding what predictor variables are included in the model and what baseline variables are selected, which can potentially introduce bias into the model (Sperandei 2013). To address this, the researcher utilised variables based on personal and environmental factors that have been identified in previous research, and carried out univariable and cross table analysis to select predictor variables for the logistic regression modelling. Predictor variables were removed from initial models based on no statistical significance and not on researcher choice.

7 Discussion

This dissertation includes findings from a meta-analysis and secondary data analysis, which address the two research objectives:

- First, to consider QoL outcomes for people with serious mental illness in supported accommodation.
- Second, understand what personal and environmental factors determined the placement of people with serious mental illness in different types of supported accommodation.

The meta-analysis showed differences in QoL outcomes for people with serious mental illness across the three supported accommodation types, which suggested that people with serious mental illness experienced increased QoL when they reside in supported housing and floating outreach accommodation. Analysis of secondary data identified that personal factors (age and diagnosis of schizophrenia) and environmental factors (length of stay and formal admission to hospital) predicted placement in supported accommodation with reduced levels of support. An analysis exploring the personal and environmental factors that predict needs identified by people with serious mental illness showed that diagnosis of schizophrenia predicted a healthcare need being identified, longer length of stay predicted having a social, educational and recreational need identified and having support provided by the Local Authority was a predictor of all needs.

7.1 Personal and environmental factors that predict the placement of people with serious mental illness in supported accommodation

The multinomial regression modelling showed that the personal factors which predicted discharge to supported housing were age and diagnosis of schizophrenia; the environmental factors were length of stay and legal status at admission. Only one environmental factor, legal status at admission, predicted discharge to floating outreach. A consideration of why these predictor variables predicted moving from high support to supported housing and floating outreach will be explored below.

7.1.1 Personal factors

7.1.1.1 Age

The findings showed that as age increased, the likelihood of being placed in supported housing increased. The increased probability was 1% for every year's increase in age. Although this is a small incremental increase, it suggests that as people with serious mental illness get older, they require supported housing. This could be considered a positive finding, as the purpose of supported housing is to provide rehabilitation to support people developing independent living skills. The explanation could be that as people with serious mental illness get older, they have residual disabilities related to self-care, social and cognitive functioning: which mean they require a supported accommodation environment that will continue to facilitate skills development (Kidd et al. 2013).

However, it has also been reported that people with serious mental illness remain in supported housing and become 're-institutionalised', whereby their skills are maintained, and opportunities for increasing autonomy and choice are not available to them (Fakhoury and Priebe 2007; McInerney et al. 2010). While age is included as a variable in research on supported accommodation, its significance as a predictor has not been widely reported. Tulloch et al. (2011) highlight that age is an important factor to be considered; although it is included in studies, explanations of why it is important are often overlooked or neglected, as the reason for it being a predictor is taken at face value by clinicians and researchers.

While some research has shown that age is not a significant predictor of accommodation type or have not discussed its significance further (Eack et al. 2007; Bejerholm 2010; Bitter et al. 2016, van Liempt et al. 2017), people with serious mental illness in Mirza et al.'s study (2008) reported that they experienced discrimination as a result of being older and living in supported accommodation, feeling there was a lack of opportunities for education and employment as services were targeted at younger people. Being older and requiring supported housing could also indicate that individuals have had continued contact with mental health services throughout their life due to their age at onset of illness. This has been reported as having a detrimental effect on people's abilities to achieve more independent living.

7.1.1.2 Diagnosis of schizophrenia

Diagnosis of schizophrenia was a significant predictor for moving to supported housing. There are proportionally higher numbers of people with a diagnosis of schizophrenia in high supported or supported housing accommodation (Valdes-Stauber and Kilian 2015; Tulloch 2008; Killaspy et al. 2016(b); Newman et al. 2018). The reasons suggested for this are the severity and chronicity of people's illness, including risk and the subsequent impact on their level of functioning, ability to complete daily living activities, relationships with others and engage in social activities (Fossey et al. 2006; Świtaj et al. 2012; Westcott et al. 2015; Killaspy et al. 2016 (b)).

At first glance, it might appear that supported accommodation with higher levels of support are required for longer periods of time. However, other studies argue that people with a diagnosis of schizophrenia should not be treated as a homogenous group, as outcomes will differ depending on factors such as duration of symptoms when they first receive a diagnosis, type of treatment received, opportunities for social interaction and employment (Harrison et al. 2001; Perkins and Repper 2013; Morgan et al. 2014). While the focus of supported housing is on rehabilitation and skills development (Killaspy et al. 2016 (a)), there is evidence that when people with schizophrenia move from high support to supported housing, there are initial gains in functioning; and while these are generally maintained at two-year follow-up, it does not continue to improve after this initial period (McInerney et al. 2010; Meehan et al. 2011).

7.1.2 Environmental factors

7.1.2.1 Length of stay

Length of stay was significant for the sample included in the multinomial regression, moving into both supported housing, which has high levels of on-site staff support (Priebe et al. 2009; Killaspy et al. 2016 (a)); and accommodation with floating outreach support, which are visited several times a week by support workers. The possible reasons for this are considered below.

High support accommodation provides 24-hour staffing where meals, other daily living activities and supervision of medication are provided for people with serious mental illness (Priebe et al. 2009; Killaspy et al. 2016(a)). High support accommodation is often experienced by people with serious mental illness as restrictive and reducing

their autonomy (Bredski et al. 2015), negatively affecting QoL. There is a challenge within high support accommodation environments in ensuring a balance between its function to provide a place where people feel safe, alongside being a supportive and therapeutic environment (Papoulias et al. 2014).

People who require high support accommodation will be experiencing continued difficulties related to self-care, social and cognitive functioning (Cook and Chambers 2009) as a result of their mental illness and symptoms. Staff work with people to reduce any risks associated with these factors, and assess their ability to move into less supported accommodation and what additional support they require. High support accommodation can be located away from individuals' family and social networks, meaning they have less opportunity to maintain social connections (Dickinson et al. 2002). Relationships with staff who support people with serious mental illness in high support accommodation can be important in the absence of regular contact with family and existing social networks. However, this can also create dependency on staff and the service (Loch 2014).

As a result, staff in high support accommodation are responsible for decisions related to when people with serious mental illness can move on from high support accommodation. This decision is informed by staff assessment of continued risks to people leaving high support accommodation in relation to the impact of their mental illness. This includes assessing illness severity, considering the impact of the person's continued experience of symptoms and the impact on their ability to manage their daily life, including looking after themselves and their living environment.

Staff attitudes can contribute to delayed discharge from high support accommodation as a result of being pessimistic about an individual's prognoses and ability to recover (Ross and Goldner 2009; Killaspy et al. 2015). This can also influence how decisions are made about where people move to, which can result in supported accommodation with higher levels of support than that needed being identified (de Girolamo 2014).

Factors external to the hospital can also affect people's ability to move on to less supported accommodation. People with serious mental illness often have extended stays in high support accommodation, even when the multi-professional team have identified them as ready to move on to supported accommodation with lower levels of support. This delay can be due to lack of suitable supported accommodation being available, restricted financial resources to fund a support package, or lack of capacity

within support providers in the local area (Tulloch et al. 2012; Afilalo et al. 2015). There is evidence that social and attitudinal environmental factors affect length of stay in high support accommodation for people with serious mental illness; and impact on decisions made about when individuals move onto other types of supported accommodation.

7.1.2.2 Formal admission to hospital

Formal admission to high support accommodation, i.e. an individual being compulsorily detained under Mental Health Act legislation to receive care and treatment for their illness without their agreement, was a significant predictor which reduced the chances of moving on to supported housing or floating outreach. A consideration of how the process of compulsory treatment impacts on the individual and could reduce opportunities for people to move into supported housing or floating outreach now follows.

Detention on a Compulsory Treatment Order (CTO) under the Mental Health (Scotland) Act 2003 means that individuals can be treated for their mental illness without their agreement, in a hospital or community setting, with the order setting out a number of conditions which the person has to comply with. These can include having to remain or live in a particular place, being given medical treatment under rules set out within the Act, having to allow visits in their home by people involved in their care and treatment, and having to attend for medical treatment as instructed (Scottish Government 2005).

While compulsory treatment is only used as required, there has been a gradual increase in the use of compulsory treatment in the UK and other Western countries (de Jong et al. 2017; Keown et al. 2018; Mental Welfare Commission 2018). The reason for this increase has not been fully established (Sheridan-Rains et al. 2019), although Keown et al.'s (2018) review of compulsory treatment in England over a 30-year period suggested that the move to community-based care - which has resulted in better case finding and increased focus on treatment and risk management – as well as changes in legislation had contributed.

Evidence to support the use of CTOs particularly in community settings is weak (Barnett et al. 2018), with limited research looking at the relationship between supported accommodation in either supporting people on CTOs or preventing people being compulsorily detained (Bone et al. 2019). O'Brien et al. (2009) found that people

were more likely to be moved into supported housing on a CTO, as it provides a more structured environment and supports increased engagement in activities. However, Puntis et al. (2017) did not find an association between CTO's and supported housing providing continuity of care.

From the individual's perspective, the experience of being placed on a CTO has implications related to choosing how care and support is accessed, and longer term outcomes when compulsory treatment ends. People with serious mental illness on CTOs report feeling frustrated that treatment often only focuses on medication and does not consider other intervention options that would improve their quality of life, with CTOs often perceived as creating a barrier to getting on with their lives (Mental Welfare Commission 2015; Durcan and Harris 2018). However, other people find that CTOs can be positive in supporting them to have a period of stability, which allows them to get on with their lives and not return to hospital (Mental Welfare Commission 2015).

The combination of increased restrictions on people's choices about their care and support, longer stays in high support accommodation and reduced chances to access supported housing or floating outreach can be considered as having a detrimental effect on their ability to have improved life outcomes.

7.2 Factors that predict needs for people with serious mental illness in supported accommodation

The meta-analysis suggested that outcomes related to wellbeing and satisfaction with life improve for people with serious mental illness as support reduces in supported accommodation from high support to supported housing and on to floating outreach; while satisfaction with living conditions and social functioning are better for those living in supported housing compared to high support accommodation. The analysis of factors that predicted needs of people with serious mental illness found that a diagnosis of schizophrenia predicted having a healthcare need identified; length of stay predicted having a social, educational and recreational need identified; and having support provided by the local authority predicted having all SDS needs identified.

In all the analyses, a majority of the cohort lived in floating outreach-supported accommodation. The type of supported accommodation was not a significant predictor for needs; however, previous research has demonstrated that living in floating outreach accommodation is seen as providing the greatest amount of autonomy and choice by people with serious mental illness (Nelson et al. 2007), allowing them to determine their daily routines and negotiate how and when people visit and support them (Piat et al. 2008).

How the type of supported accommodation may inform identification of needs alongside the outcomes reported will now be discussed.

7.2.1 Healthcare needs of people with a diagnosis of schizophrenia

Research shows that people with serious mental illness have poorer health outcomes. The World Health Organisation reports that people with mental illness die earlier than people in the general population, with a 10-25-year reduction in life expectancy (WHO 2018). Physical health co-morbidities, including cardiovascular disease, respiratory illness, cancer and diabetes, contribute to the mortality gap between people with serious mental illness and the general population (Cornell et al. 2017; Hayes et al. 2017).

The results show that a diagnosis of schizophrenia predicted having a healthcare need identified, compared to a diagnosis of mood disorder. For people with a diagnosis of schizophrenia, the prevalence of type 2 diabetes is 2-3 times higher compared to the general population; people with schizophrenia who develop cancer are three times more likely to die than those in the general population who do the same; twice as likely to develop heart disease as the general population; while 61% of people with schizophrenia smoke, compared to 33% of the general population (The Schizophrenia Commission 2012).

A variety of reasons have been proposed for why people with schizophrenia have increased physical health issues: including the impact of living with a serious mental illness, physical neglect, poor diet, smoking tobacco and being dependent on alcohol or other substances. They may also have more sedentary lifestyles due to reduced participation in activities. Prescribed psychotropic medication, particularly polypharmacy, can have side-effects including weight gain and hypertension, which contribute to developing physical health co-morbidities such as diabetes and heart disease.

This is confirmed by the most recent Adult Inpatient Care Census in Scotland (Scottish Government 2018 (c)), which showed that the most frequent physical health co-morbidities recorded on the census date were hypertension, sensory impairment, diabetes, chronic pain conditions and cardiovascular disease. 32% of people were recorded as smoking tobacco, 19% had been dependent on alcohol in the four weeks prior to admission and 18% had abused substances (excluding alcohol) over the same period (Scottish Government 2018(c)). People with schizophrenia are, moreover, less likely to seek help for physical health conditions, receive inconsistent routine physical health checks or have physical health problems attributed to their mental illness (De Hert et al. 2011). The results of the analysis show that healthcare needs are being increasingly identified at SDS assessment by people with schizophrenia.

While it is not clear what healthcare needs are being met, the results suggest that getting support with healthcare is important to people with a diagnosis of schizophrenia. This is confirmed by concerns about physical health reported by people interviewed in the Scottish Schizophrenia Survey (Larkin and Simpson 2015). They reported that their diagnosis had a significant impact on their physical health: recognising that their physical and mental health were linked and it was sometimes difficult to prioritise between them. While there have been improvements in physical health monitoring for people with schizophrenia (The Schizophrenia Commission 2017), physical health co-morbidities were not recorded in either of the datasets included in the analyses.

7.2.2 Length of stay

Within the cohort, if a person had a longer stay in high support accommodation, they were more likely to have a social, educational and recreational need identified. Prolonged stays in high support accommodation negatively affect the involvement of people with serious mental illness in social activities and connections with social networks that support community living (Dickinson et al. 2002; Freeman et al. 2004); however, only 28% of the cohort identified having this need. This result is interesting, as research indicates that people with serious mental illness living in the community view community networks as important in supporting their recovery (Townley 2015); and acknowledge they require support to enhance their opportunities for participation in the community, including education and employment (Mirza et al. 2008).

People with serious mental illness living in supported accommodation report feeling frustrated with the lack of activities available to them beyond self-care and domestic tasks, leaving them with unstructured time, feeling dissatisfied (Bengtsson-Tops et al. 2014), and often encountering barriers to accessing leisure activities (Equality and Human Rights Commission 2017). The analysis indicates that people with serious mental illness in this cohort are mainly identifying basic care and support needs as part of the SDS assessment process.

From a humanistic perspective, Maslow's Hierarchy of Needs (1966) states that people's basic physiological needs (food, water, shelter, clothing, sleep, breathing) need to be met before they can move towards meeting higher needs, such as safety and security (health, employment, property, family and social stability) or love and belonging (friendship, family, intimacy, sense of connection). Not having these needs met can also make established higher needs vulnerable (Pilgrim 2015). Housing is considered a basic human right, which people with serious mental illness have equal rights to.

The United Nations Declaration on the Rights of People with Disabilities Article 19 (cited in Boardman 2016) states that in addition to having stable housing, people with disabilities must have equal access to opportunities for participation and choice, supported by the equitable provision of services to prevent isolation or segregation from the community. As the cohort included in the study consists of working age adults, it is interesting to note that only a longer length of stay predicted the identification of a social, recreational and educational need; data from the Adult Inpatient Census 2018 (Scottish Government 2018 (c)), showed that only 4% of people included in the census were in employment. Also, as employment data is not routinely gathered in either of the datasets used in the study, it was not possible to establish if people in the cohort studied were in employment. However, it could suggest that people with serious mental illness do not feel able or have not considered education or employment outcomes as part of their support needs.

It has been established that barriers within the system could contribute to only basic needs being identified. These include the impact of constrained budgets, which restrict the support packages which can be funded (MHF, 2016b); and increasing demand on community mental health services necessitating these being directed to people in distress, which takes priority over those whose housing and mental health is stable (Fleury et al. 2014).

The result for people with serious mental illness of not being able to access funding to support social, educational and recreational needs is that they can feel marginalised, isolated and disconnected from others (Borg and Kristiansen 2004, Chesters et al. 2005, Killaspy et al. 2014; Stadnyk et al. 2013). This leads to poor personal identity and competency, and a poverty of expectation: resulting in limited participation in meaningful everyday activity, including education and work (Krupa et al. 2003; Leufstadius et al. 2006; Minato & Zemke, 2004, Shimitras et al. 2003; Prior et al. 2013).

7.2.3 Support from Local Authority and identification of needs

The result that receiving support from the Local Authority rather than any other provider predicts the identification of all needs is interesting. This may be a consequence of how the SGSCS data was collected for the selected year included in the analysis; may reflect a bias related to who collects the data (primarily, social workers); and what existing services are available to people with serious mental illness in supported accommodation.

There is evidence that people with mental illness can benefit from having increased choice and control over how their support needs are met via direct payments and other forms of SDS. Tew et al. (2015) reported on how personalised budgets can be a mechanism for recovery if negotiated well. Hamilton et al. (2016) found that in addition to a personal budget meeting personal and daily living needs, some individuals used their budget to engage in education and employment. Both studies reported that successful implementation of personal budgets among people with mental illness depends on relationship-building to facilitate co-production, time and flexibility to accommodate fluctuation in people's mental illness.

However, there are debates regarding the philosophical and practical challenges that have faced the implementation of personalised budgets delivered through SDS. Pearson et al. (2018) reported that the key challenges facing the rollout of SDS in Scotland have been the implementation of Health and Social Care integration, two years after SDS was first implemented, with concerns raised by disability and third sector organisations that it could become lost in this process; SDS being located as a social work role affecting the engagement of other health partners; and the impact of austerity on SDS, as there has been a long term reduction in social care budgets, community services and infrastructure.

Hamilton et al. (2016) noted the lack of clarity within policies about what choice, control and power actually mean in social care. They also suggest that social care services have difficulty giving up power and control as part of the personalisation process. This is due to a combination of the fluctuating nature of the conditions of people with mental illness, which can affect their ability to make decisions at times, and the focus of mental health services on managing risk. Transforming Social Care (Scottish Government 2018(b)) provides confirmation that the Scottish government are exploring what is required for people with specific conditions to be better supported, including people with mental illness. However, until some of the system-wide changes have occurred, the impact for people with specialised needs may be limited (Scottish Government 2018(b)).

7.3 Limitations of the study

The purpose of this study was to investigate supported accommodation for people with serious mental illness by considering QoL outcomes including wellbeing, satisfaction and social functioning in three types of supported accommodation; and explore what personal and environmental factors determined the placement of individuals in different types of supported accommodation. A meta-analysis was conducted, and identified differences in QoL outcomes for people with serious mental illness across the three supported accommodation types, suggesting that outcomes improve when they reside in supported housing and floating outreach accommodation. However, a significant number of people with serious mental illness continue to have long stays in high support accommodation. The factors associated with people with serious mental illness moving from high support accommodation to supported housing and floating outreach services have not been identified.

Secondary data analyses using logistic regression determined the personal and environmental factors that predict placement of individuals in supported housing and floating outreach accommodation. The secondary datasets were reviewed to ascertain if an analysis could be completed to identify predictors of QoL outcomes in supported accommodation. Although the datasets did not report QoL outcomes, a supplementary analysis was run to determine what personal and environmental factors predicted the identification of Personal Care, Domestic Care, Healthcare, Social, Educational and Recreational Needs by people with serious mental illness.

The limitations of the study will be explored in relation to its research questions and the use of secondary datasets.

QoL outcomes

Limitations with the meta-analysis owe to the small number of studies included in each, and the inclusion of studies with different experimental designs introducing heterogeneity and bias: which could not be analysed due to inconsistent reporting of demographic data. The results therefore need to be considered with caution. However, they suggest there are different QoL outcomes related to wellbeing, satisfaction with living conditions and social functioning between the three types of supported accommodation.

While these findings are tentative, previous meta-analyses exploring outcomes in supported accommodation environments have encountered similar difficulties with regards to availability of suitable data and consistency in how supported accommodation is described (Chilvers et al. 2010; Leff et al. 2009). This lack of consistency has been highlighted by researchers for some time (Newman 2001; Tabol et al. 2010); and the subsequent impact on synthesising literature on supported accommodation noted (McPherson et al. 2018(a)). The challenge in conducting research here is that services have been developed and evolved in response to local, economic and governance factors: meaning there is variability in where and how supported accommodation is provided, including location, staffing levels and target population (McPherson et al. 2018(b)).

There are similar limitations with how QoL outcomes are defined and measured across studies for people with serious mental illness. While there have been assessments developed specifically for this population, including the Lehman Quality of Life Interview (Lehman 1988); Lancashire Quality of Life Profile (Oliver et al. 1997); and the Manchester Short Assessment of Quality of Life (Priebe et al. 1999), these can only give an indication of satisfaction with life and wellbeing, living conditions and social functioning, and are unable to give a clear indication of someone's motivation to participate in activities that they need, want and enjoy doing.

The supplementary analysis determined what personal and environmental factors predicted the identification of Personal Care, Domestic Care, Healthcare, Social, Educational and Recreational Needs as part of the assessment process for SDS. IN previous studies, it has been the number of unmet needs that has been shown to

affect wellbeing (Hansson and Björkman 2007; Ritsner 2012(b); Emmerink and Roeg 2016). However, unmet needs are not recorded within the SGSCS data, so it is not possible to consider a tentative connection between the results of the supplementary analysis and the outcome from the meta-analysis.

Predictors of placement following stay in high support accommodation

Personal and environmental factors that predict placement in supported accommodation were successfully identified - but there were some limitations in interpreting how these factors were important in supporting decision-making in practice. Limitations which prevented further investigation of these predictors will now be discussed.

Additional data items including age at illness onset, symptom severity and duration, functional ability, staffing levels within supported accommodation and if people were employed and participating in social and leisure activities were not recorded in the secondary datasets used. Age at illness onset, duration and severity of symptoms, and functional ability have been shown to predict longer term outcomes for people with serious mental illness in supported accommodation. Staffing levels would give an indication of the effect of the social environment within supported accommodation; and whether people are employed and participating in leisure and social activities would allow an exploration of whether participation in these activities predicted the type of supported accommodation which people are placed in.

A cross-sectional dataset was created to support the secondary data analysis. The analysis therefore only utilised variables from a one-year time period, which meant that multiple admissions and discharges could not be explored. Exploration of longitudinal data over the three years included in the secondary datasets would extend the predictors with regard to length of stay and type of supported accommodation identified at discharge. Personal factors have been identified in other studies as predicting length of stay: including having a diagnosis of schizophrenia, living in supported housing or having unstable housing and being unemployed (Tulloch 2011; Newman et al. 2018). This could allow a more detailed analysis of whether these factors contributed to length of stay and final supported accommodation placement.

Identification of type of accommodation prior to admission and if this remained the same or changed on discharge from high support accommodation would give a more

complete picture of changes in needs for people with serious mental illness. It would also allow exploration of time between admissions to high support accommodation and if previous psychiatric care was significant, as these have also been shown to be important in predicting both where people are placed and needs identified.

Secondary data

Three issues will be considered in relation to the use of secondary data: lack of control over how it was collected, original purpose of the data, and missing data. The study used national datasets to answer Research questions 1.1 and 2.

One of the disadvantages of using secondary data is that the researcher has no control over how it has been collected and how accurate it is (Vartanian 2011). The Scottish Morbidity Record - Scottish Mental Health and Inpatient Day Case Section (SMR04) is a national dataset which collects episode level data on patients receiving care at psychiatric hospitals at the point of both admission and discharge. The collated dataset is used to support healthcare service planning (Information Services Division, 2017). The SMR04 data has been gathered since the 1960s; returns are closely audited. The SGSCS is a census of home care services provided or purchased by Scottish Local Authorities. Data regarding Self-Directed Support (SDS) has only been collected since it was introduced in Scotland in 2014. The additional information recorded concerns any new person referred for social care or existing people receiving support at point of review who were offered SDS.

The Scottish government reported that as a result of this significant change, data from some local authorities remained incomplete in the 2015-16 dataset (Scottish Government 2017). As a result, one of the main recording issues was that not all local authorities were able to record all SDS options in their systems; in particular, Option 3, which indicates when a person has chosen during a review to continue with existing services. Consistent data was returned for people who chose SDS Option 1 (direct payments), which means that the analysis is limited to this group of people. Therefore, comparison of any associations between people with serious mental illness who chose other SDS options or receive support with health and social care needs who have not been reviewed could not be made.

Thus potential differences between these different groups regarding what needs were identified, the type of support received and if and how this differs for people with mental illness who have not selected one of the SDS options could not be explored.

As a result, representativeness of the outcome could be questioned (Maguire and O'Reilly 2015). The issue of identifying datasets where services received by all people with serious mental illness are included so that comparison can be made is a key consideration for future research.

Another limitation associated with the use of secondary data is what the original purpose of the dataset is and the impact of this on the analysis. The datasets are both collected by the Scottish government and have specific purposes. The SMR04 data is clinically focused, linked to admission and discharge from psychiatric hospital; and as a result, only includes three variables which refer to follow-up arrangements for a person following discharge (Other agencies, Guardianship, CPA). These categories were inconsistently completed: with the small numbers of data meaning they were excluded from the final analysis, due to the possibility of potentially identifiable information being revealed (National Services Scotland 2013). This meant that the data included to identify factors associated with discharge were limited to predominantly personal factors.

The data also does not include variables which would indicate clinical decision-making in relation to discharge from hospital: for example, assessed level of risk or functional ability. Partly due to the issues with SGSCS data collection, only 4% of people included in the SGSCS for 2015/16 had a mental illness diagnosis. This reduced the available data for analysis and meant that two variables were excluded from the final logistic regression modelling (Carer and Financial Contributor), due to the danger of potentially identifiable information being revealed (National Services Scotland 2013).

Finally, missing data is also an issue here. As the SMR04 data has been collected for a longer period of time, 97% data completeness was reported by the Information Services Division (2017) for 2015-2016. However, due to limitations with the SGSCS, the estimated implementation rate of SDS for 2015/16 was 27.3%, taking into account all known recording issues (Scottish Government 2017(c)) - which means that 72.7% of people are not accounted for. Decisions made about removing data can introduce bias into the final sample; therefore, decisions made about deleting cases need to be carefully considered. Following data cleaning, application of the diagnosis inclusion criteria and supported accommodation type, the datasets had limited missing data. This is considered satisfactory, as the analysis was exploring defined research questions with predefined predictor variables (Smith et al. 2011).

Consequently, missing data had minimal impact on the analysis within the main study. However, improved data completeness in the SGSCS dataset would support and improve future research into factors associated with SDS options for people with serious mental illness.

8 Summary and recommendations

8.1 Significance and contribution of the study

The meta-analysis suggested that people with serious mental illness achieved greater wellbeing, satisfaction with living conditions and social functioning in less restrictive supported accommodation. The supplementary analysis identified factors that predicted needs. A diagnosis of schizophrenia predicted having a healthcare need, length of stay predicted having a social, educational and recreational need; and having support provided by the local authority predicted having all needs identified. Predictors of accommodation placement were age, diagnosis of schizophrenia and extended lengths of stay in high support accommodation. For future research, it is recommended that personal and environmental factors are explored within supported accommodation environments to understand how these affect the recovery of people with serious mental illness and assess outcomes associated with different placement types.

This is the first time that quality of life outcomes for people with serious mental illness have been meta-analysed between three supported accommodation types. It is also the first time that two large government databases have been linked together by subject identifiers. This linkage has provided a combined dataset which has facilitated a simultaneous investigation of predictors of accommodation placement and personal and environmental factors that predict needs which had not previously been possible within this field.

8.2 Unique contribution of study

- **Statement 1:** As support reduces in supported accommodation from high support to supported housing to floating outreach, QoL increases. Satisfaction with social functioning and living conditions are better for people with serious mental illness living in supported housing compared to high support accommodation. People with serious mental illness living in floating outreach services have better overall wellbeing compared to the other supported accommodation types.
- **Statement 2:** Age, diagnosis of schizophrenia and length of stay are predictors of placement in supported accommodation upon discharge from high support accommodation.
- **Statement 3:** Diagnosis of schizophrenia predicted having a healthcare need identified; length of stay predicted having a social, educational or recreational need identified; and having support provided by the local authority predicted having all needs identified.

The next section goes on to view these unique contributions within policy, practice and research.

8.3 Policy Recommendations

As previously described, Scotland's mental health policy is ambitious and places a duty on local authorities to provide services for those who have or have had a mental health problem, promote their wellbeing and social development, minimise the effect of mental disorder and give people the opportunity to lead lives as normal as possible (Scottish Government 2017a). Lack of key variables within datasets currently collected by the government mean that it is not possible to ascertain if these outcomes are being achieved

There are, therefore, two key recommendations for policy that have emerged from this research:

- **Key Policy Recommendation 1:** The Scottish government should instruct the Information Services Division (ISD) to provide support to health and social care communities to more consistently gather data on people who have serious mental illness, and enable detailed scrutiny on how to better support this population.
- **Key Policy Recommendation 2:** The Scottish government should instruct the ISD to require additional clinical and social functioning variables to be collected: enabling it to monitor progress on policy commitments within the Mental Health Policy directives.

8.4 Practice Recommendations

The current research offers information for practitioners that can assist in decision-making when people are moving from high support accommodation to supported housing and floating outreach accommodation.

Two key recommendations for practice have emerged from this research:

- **Key Practice Recommendation 1:** The practice communities should partner with the Information Services Division (ISD) to build clinical routines which commit to consistent data gathering with this population.
- **Key Practice Recommendation 2:** The practice communities should partner with the ISD to develop variables which would provide additional patient data to inform provision of supported accommodation and support government policy.

8.5 Research Recommendations

There are five key recommendations for research:

- **Key Research Recommendation 1:** Research communities should consider consistently including this important population of people with serious mental illness.
- **Key Research Recommendation 2:** Research communities should consider exploiting currently available datasets before gathering primary data.
- **Key Research Recommendation 3:** Research communities should consider conducting longitudinal studies using currently available datasets to identify further predictors of placement in supported accommodation.
- **Key Research Recommendation 4:** Research communities should consider quantitative research using primary data collection to determine personal and environmental factors in supported accommodation which affect participation among people with serious mental illness.
- **Key Research Recommendation 5:** Research communities should consider conducting qualitative research with people with serious mental illness living in supported accommodation, to explore the opportunities and restrictions to participation.

8.6 Potential audiences and beneficiaries of this research

The potential non-academic audiences and beneficiaries of this research include:

- **Service users and carers:**
 - Validation of service user experiences of supported accommodation.
 - Evidence-based platform to advocate and campaign for improving factors that influence placement in supported accommodation and identification of needs.
- **Clinicians and third sector organisations:**
 - Evidence-based information to inform decisions regarding placement of people in supported accommodation
 - Evidence-based information to inform interventions for people in supported accommodation.
- **Government (national and local) and funding agencies:**
 - Evidence based information to inform commissioning of supported accommodation
 - Evidence based information to inform future research and development of supported accommodation services.

8.7 Impact, communication and dissemination plan

8.7.1 Pathway to this impact

Mitton et al. (2007) have noted the importance of ensuring that research findings are made available, to provide a foundation to creating impact.

The researcher plans to share the results of this study in a variety of formats and ways as detailed below.

Local dissemination

The researcher plans to share this research with local mental health clinicians, third sector organisations, service user and carer groups via existing forums and meetings.

National and international dissemination

The researcher plans to publish the results and attend conferences to share this research with national and international audiences, as follows:

Publication plan			
	Title	Target Journal	Alternate Journal
1.	Quality of life outcomes for people with serious mental illness living in supported accommodation: systematic review and meta-analysis.	British Journal of Psychiatry IF: 5.867	Social Psychiatry and Psychiatric Epidemiology IF: 2.918
2.	Factors that predict placement in supported accommodation for people with serious mental illness.	Social Science and Medicine IF: 3.007	PLoS One IF: 2.766
3.	Brief report: How can occupational therapy address the marginalisation of people with serious mental illness living in supported accommodation?	Canadian Journal of Occupational Therapy IF: 1.327	Scandinavian Journal of Occupational Therapy IF: 1.162

Conferences

- Royal College of Psychiatrists International Congress 2019, 1-4 July, London.
- Refocus on Recovery International Conference 2019, 3-5 September, Nottingham.

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9 Appendices

- Appendix 1: Example search for systematic review
- Appendix 2: Funnel plots showing publication bias
- Appendix 3: Sub-category analysis: QoL Living conditions
- Appendix 4: Sub-category analysis: QoL Social Functioning
- Appendix 5: Influential plots
- Appendix 6: Data codebook
- Appendix 7: QMU Ethics Letter of Approval for Study
- Appendix 8: PBPP approval for data linking

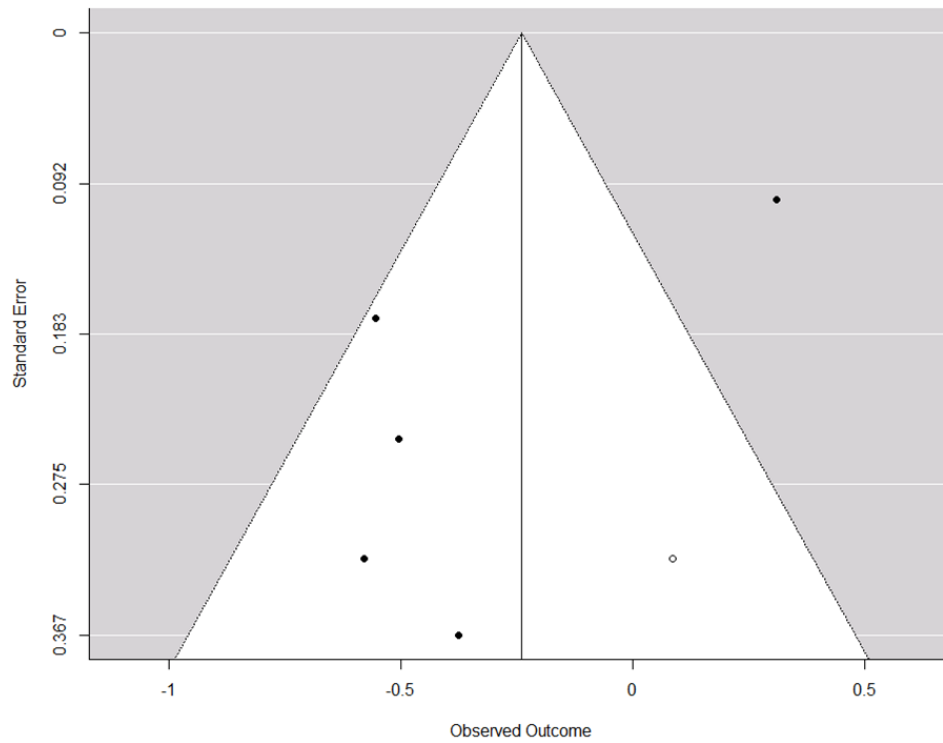
Appendix 1: Example search for systematic review

Search Strategy: PsycInfo

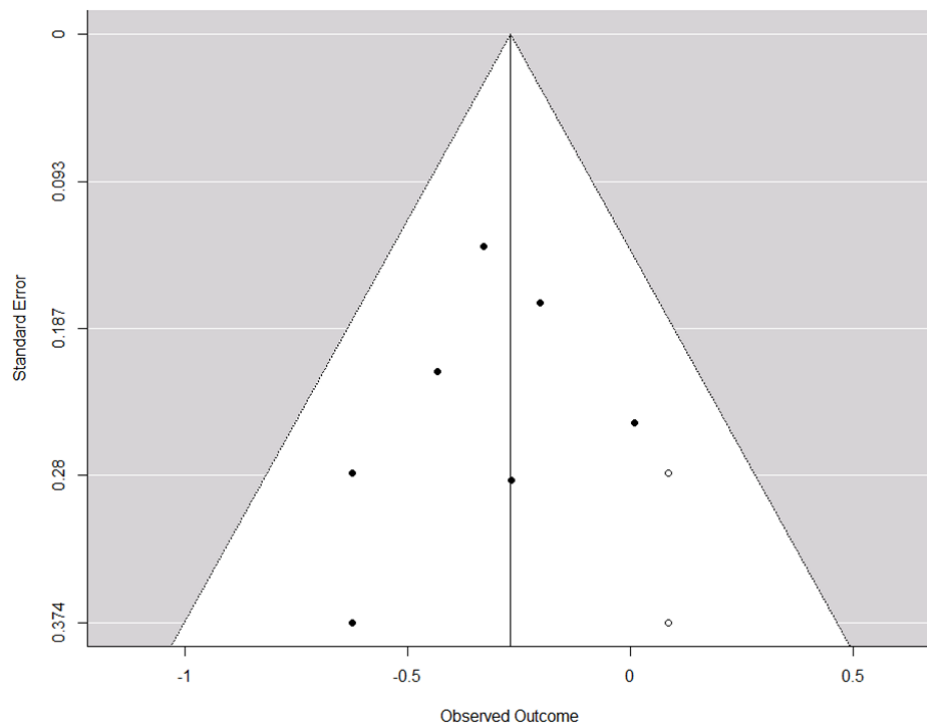
01. resident*
02. hous*
03. accommod*
04. commun*
05. commu*
06. home*
07. 1 or 2 or 3 or 4 or 5 or 6
08. support*
09. shelter*
10. outreach*
11. 8 or 9 or 10
12. 7 and 11
13. residential treatm*
14. residential facility*
15. 13 or 14
16. supported hous*
17. public hous*
18. 16 or 17
19. 12 or 15 or 18
20. adult*
21. severe mental illness
22. persistent mental illness
23. 21 or 22
24. 19 and 20 and 23

Appendix 2: Funnel plots showing publication bias

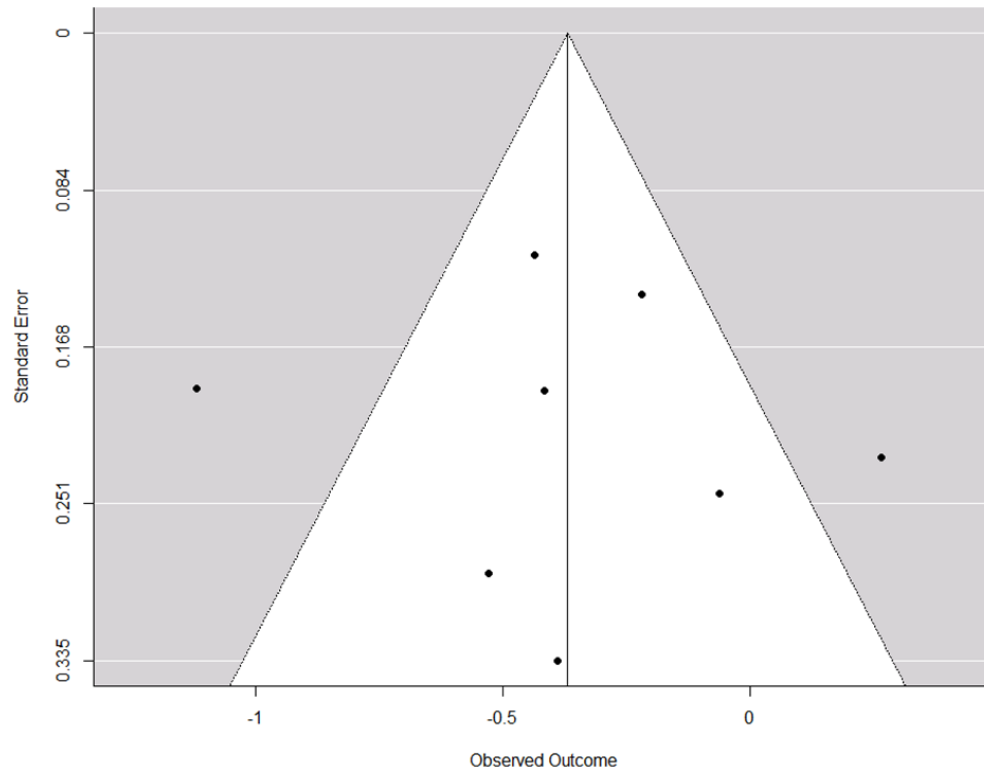
High Support (Inpatient) vs Supported Housing – Wellbeing



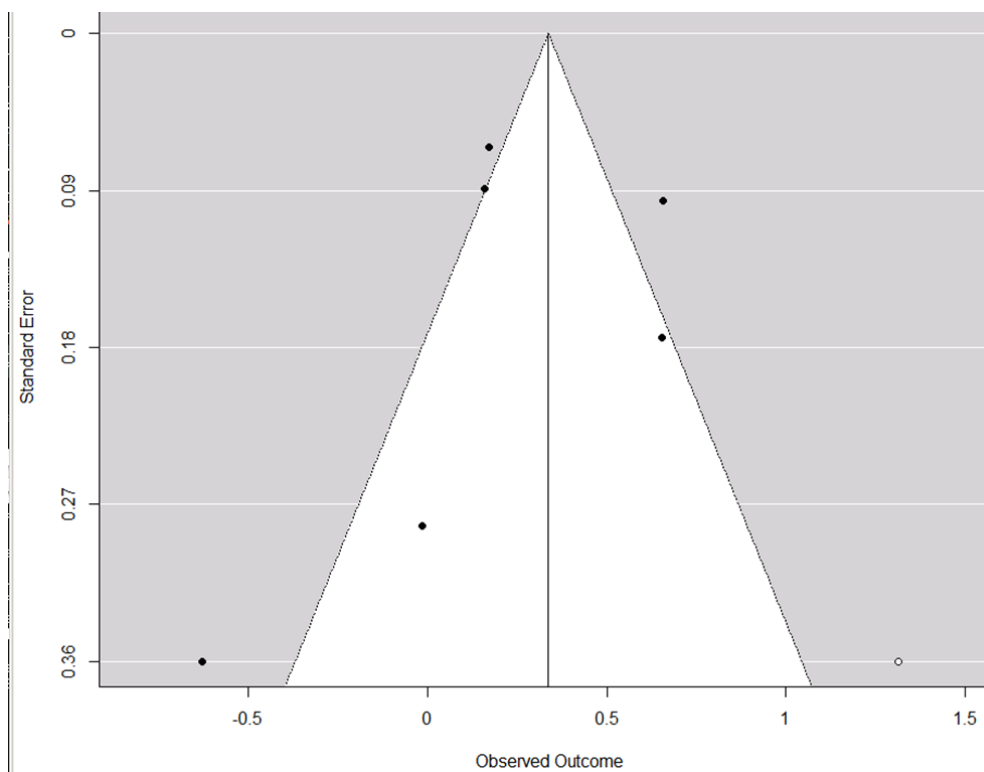
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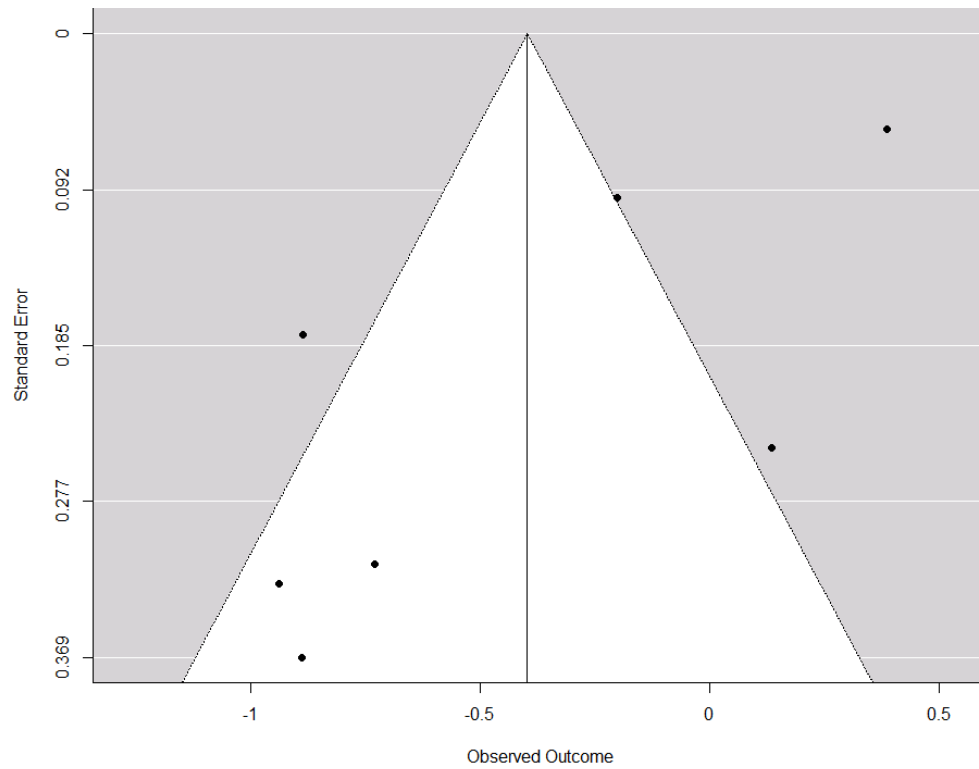
High Support (Inpatient) vs Supported Housing – Social Functioning



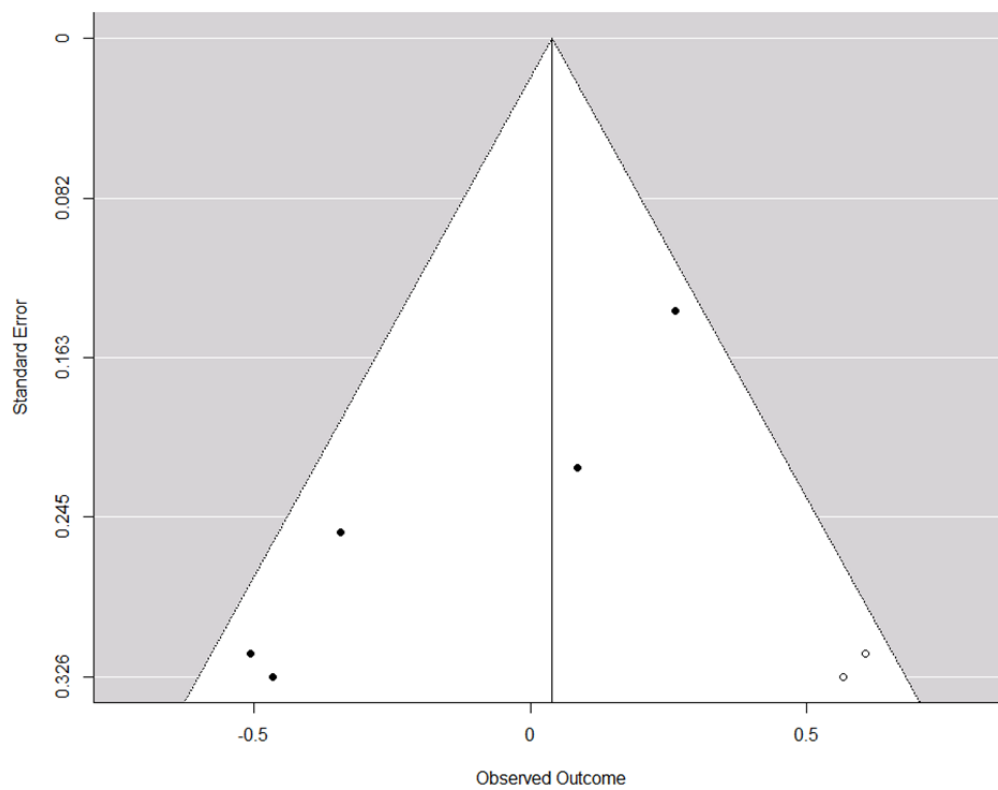
Supported Housing vs Floating Outreach Services – Wellbeing



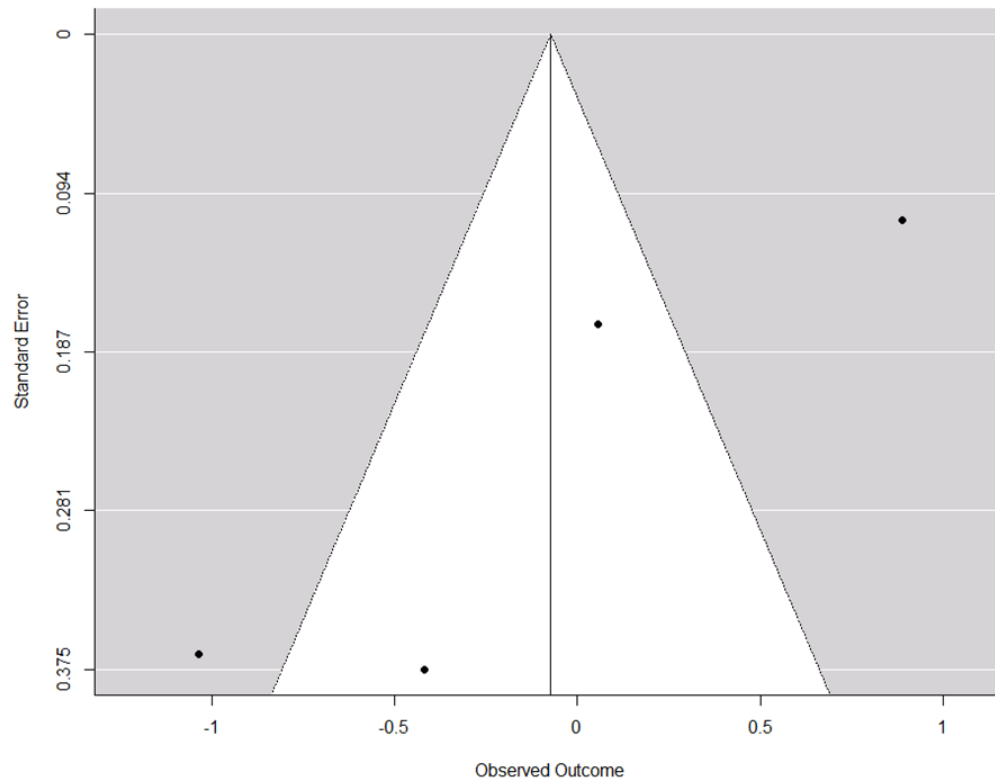
Supported Housing vs Floating Outreach Services – Living Conditions



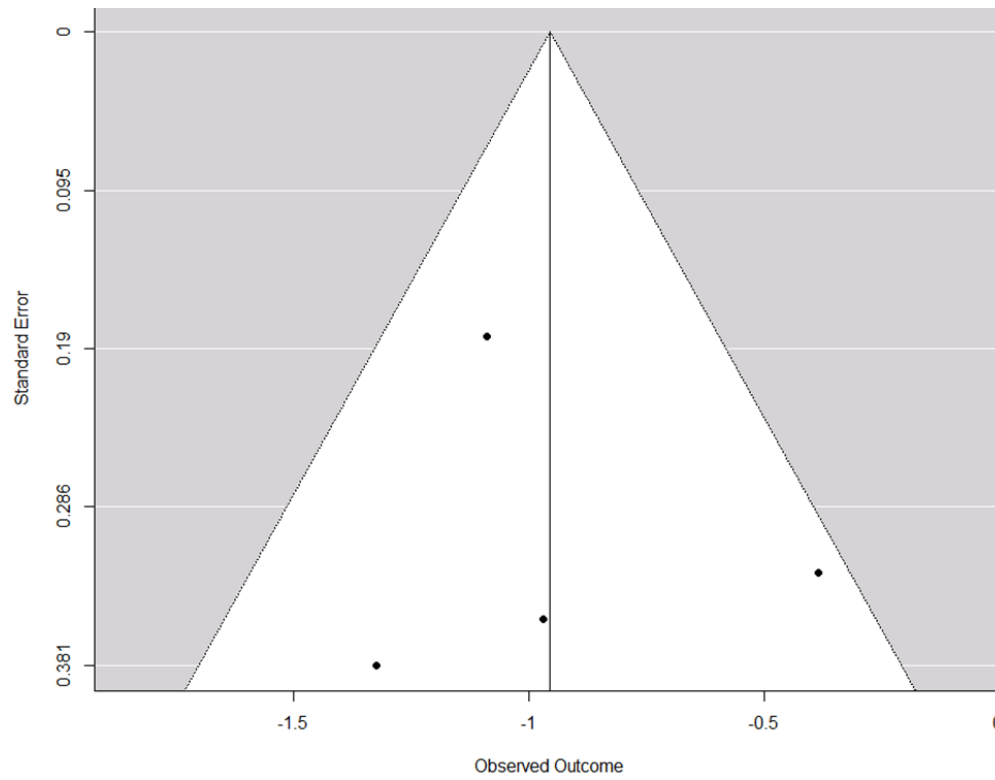
Supported Housing vs Floating Outreach Services – Social Functioning



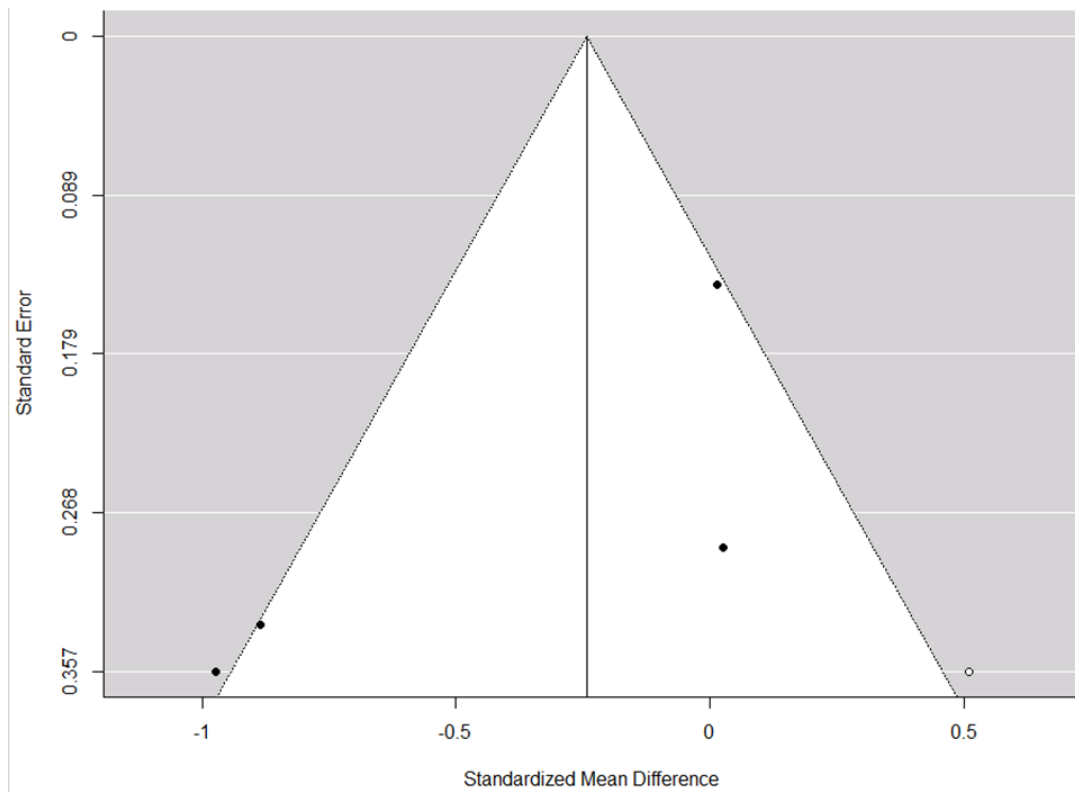
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High Support (Inpatient) vs Floating Outreach Services – Living Conditions

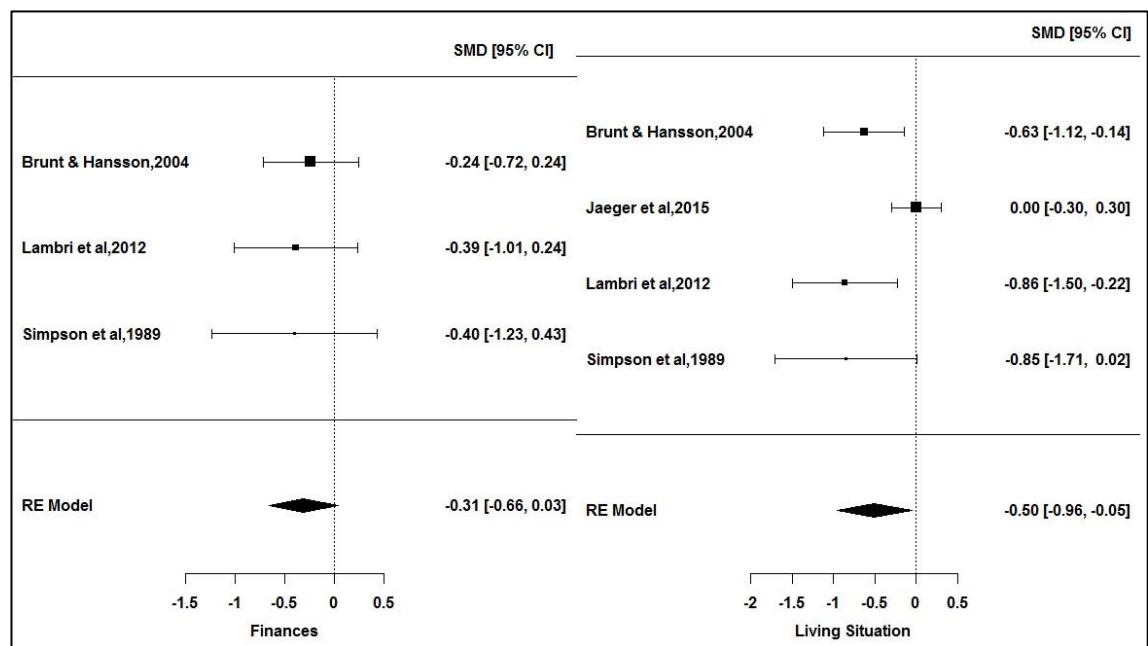


High Support (Inpatient) vs Floating Outreach Services – Social Functioning



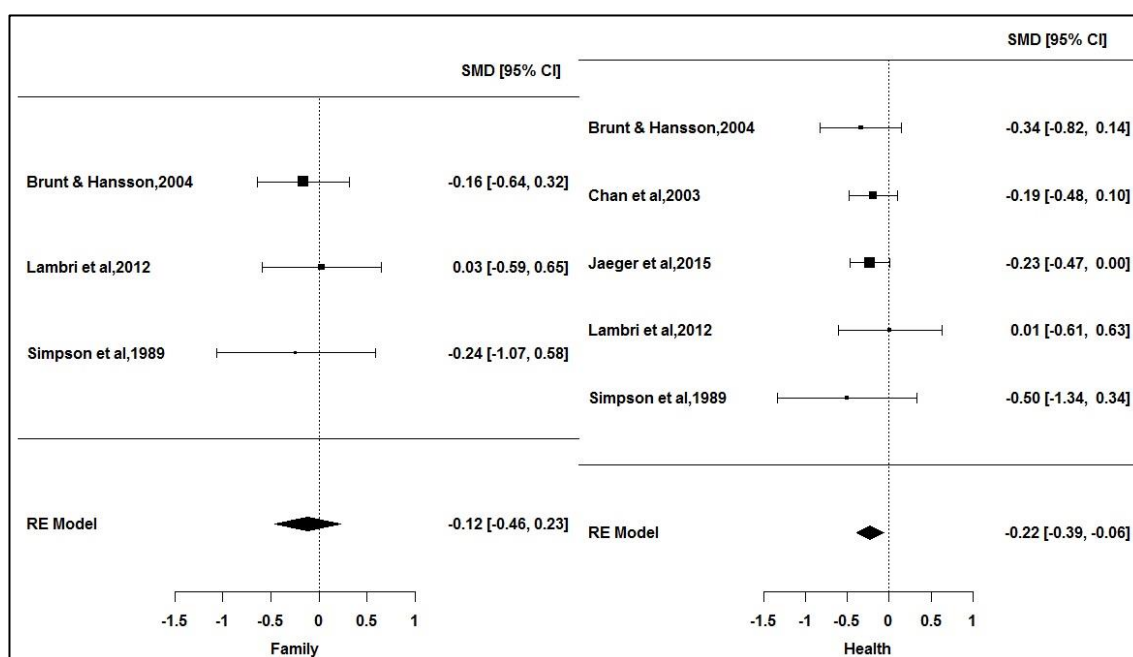
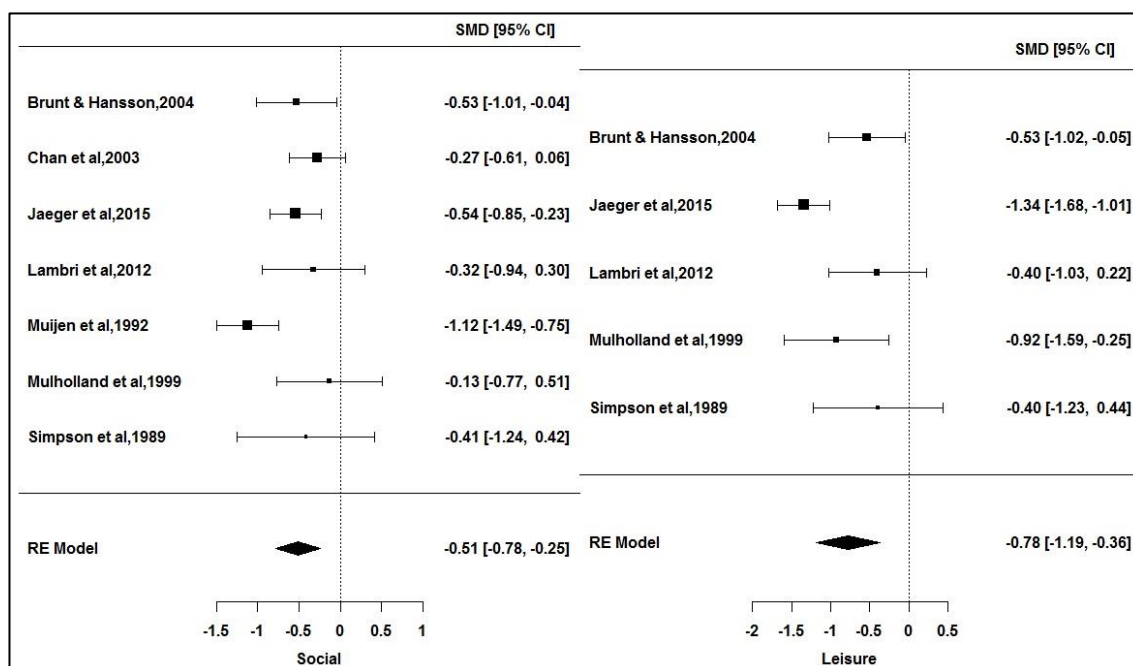
Appendix 3: Sub-category analysis: QoL Living conditions

Comparison of QoL Living Conditions outcomes for individuals in High Support and Supported Housing



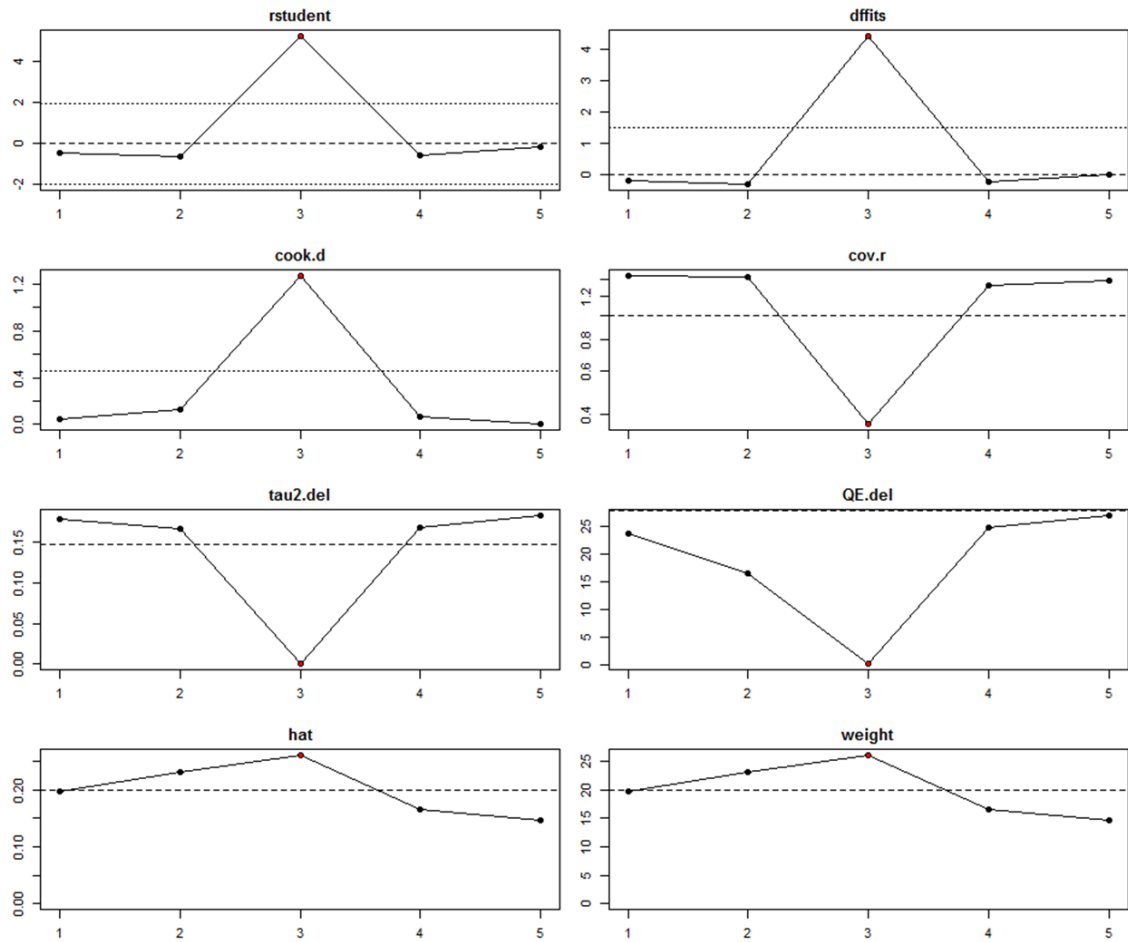
Appendix 4: Sub-category analysis: QoL Social Functioning

Comparison of QoL Social Functioning outcomes for individuals in High Support and Supported Housing

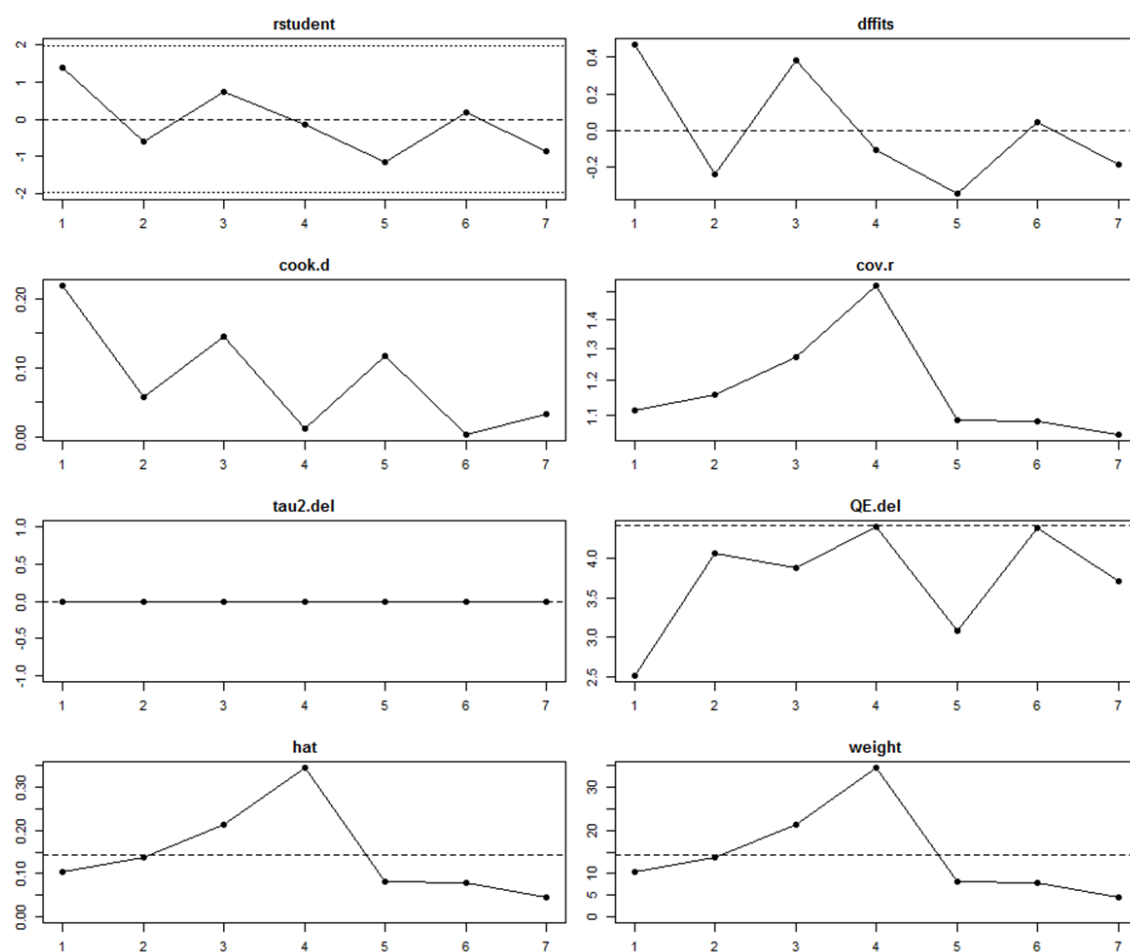


Appendix 5: Influential plots

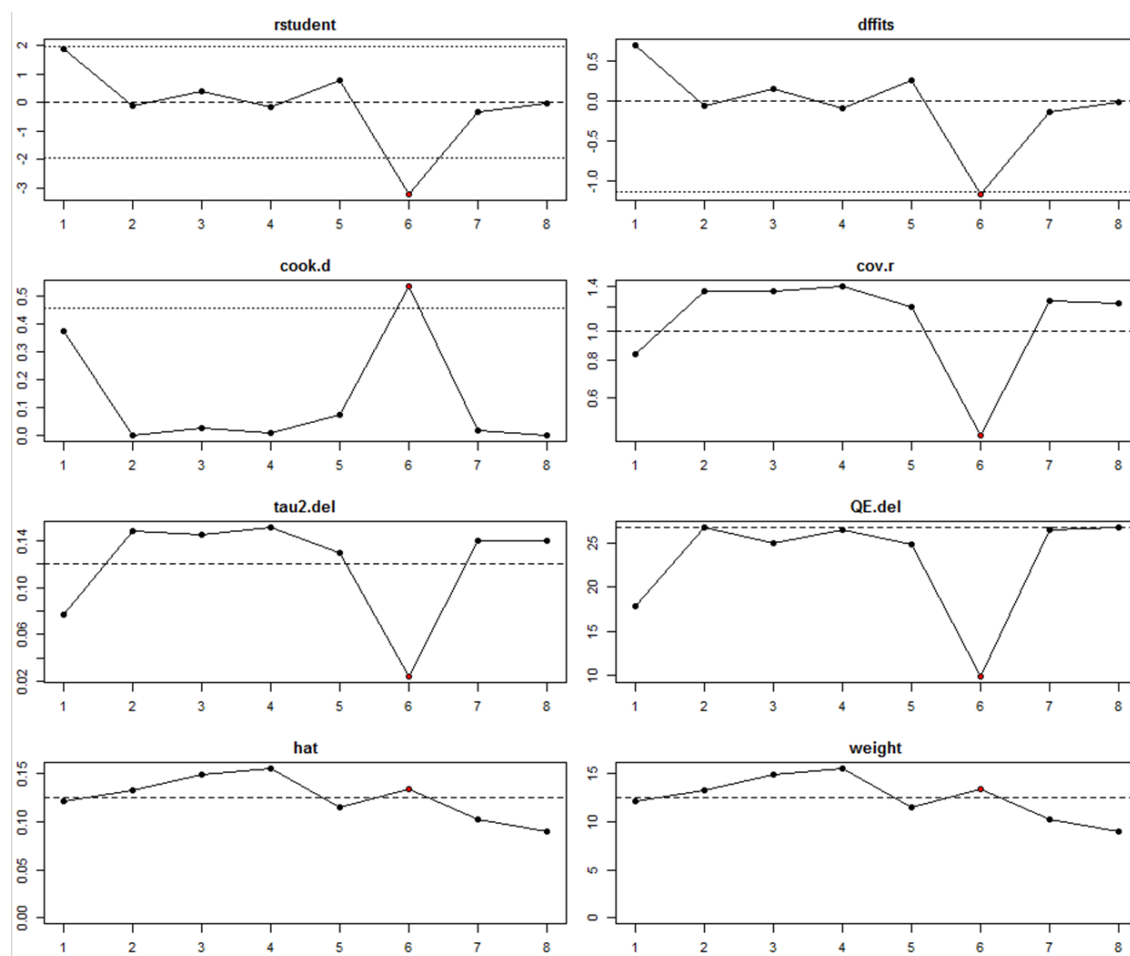
High Support vs Supported Housing – Wellbeing



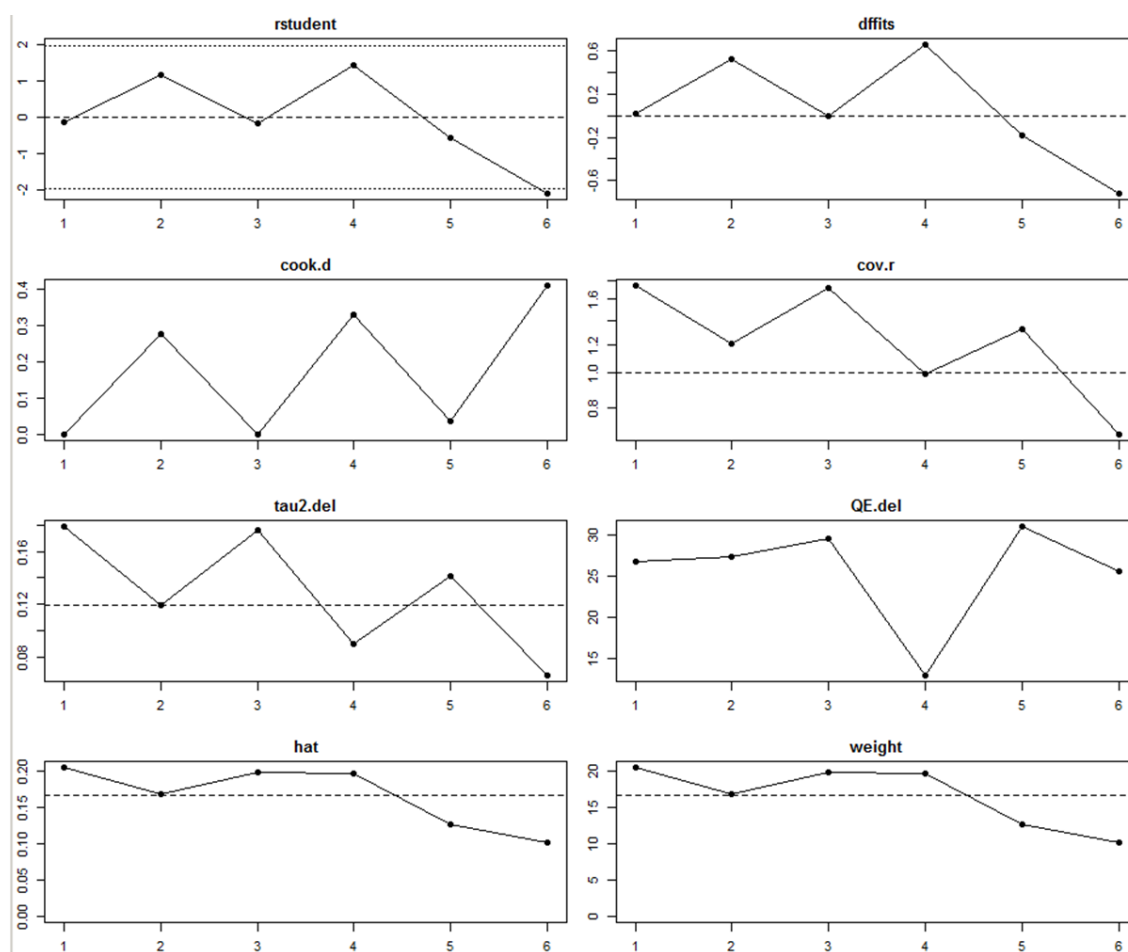
High Support vs Supported Housing – Living Conditions



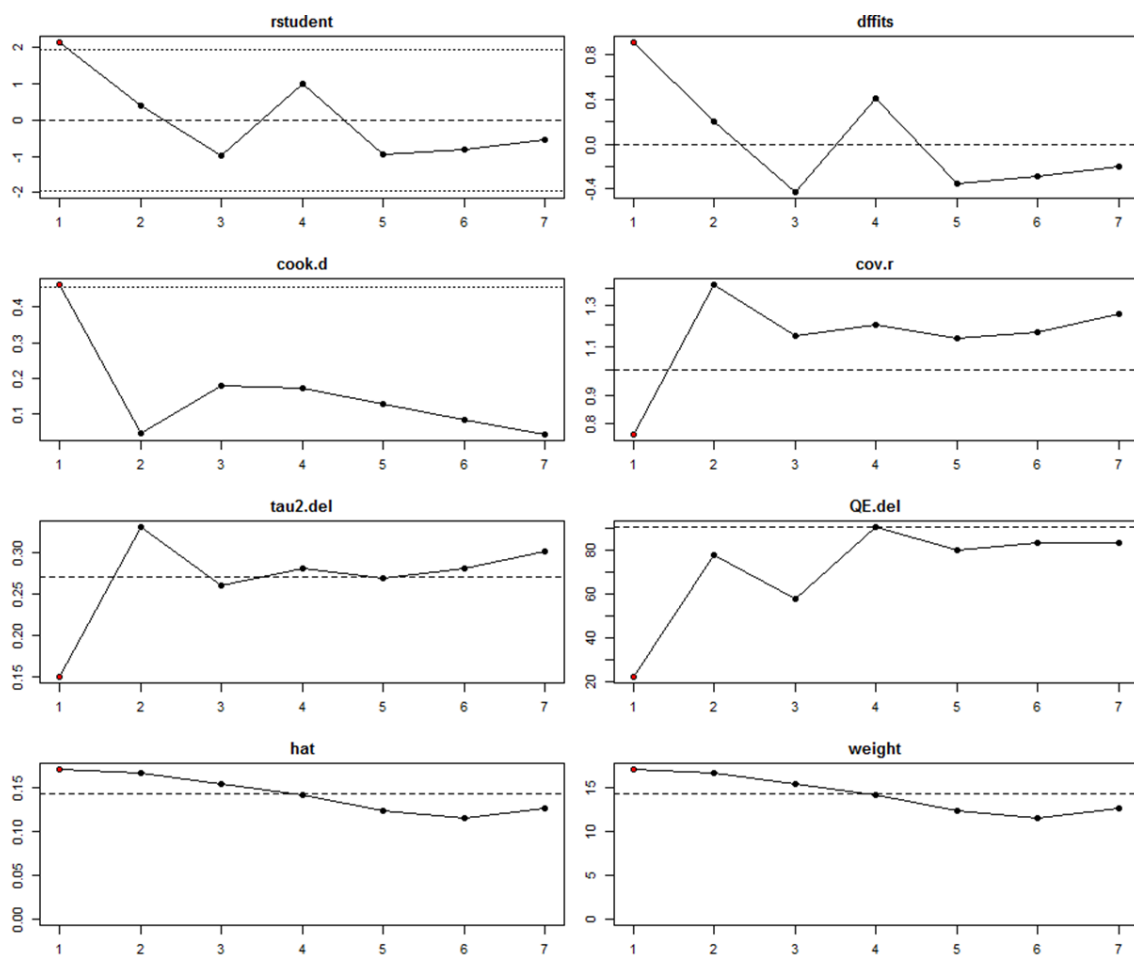
High Support vs Supported Housing – Social Functioning



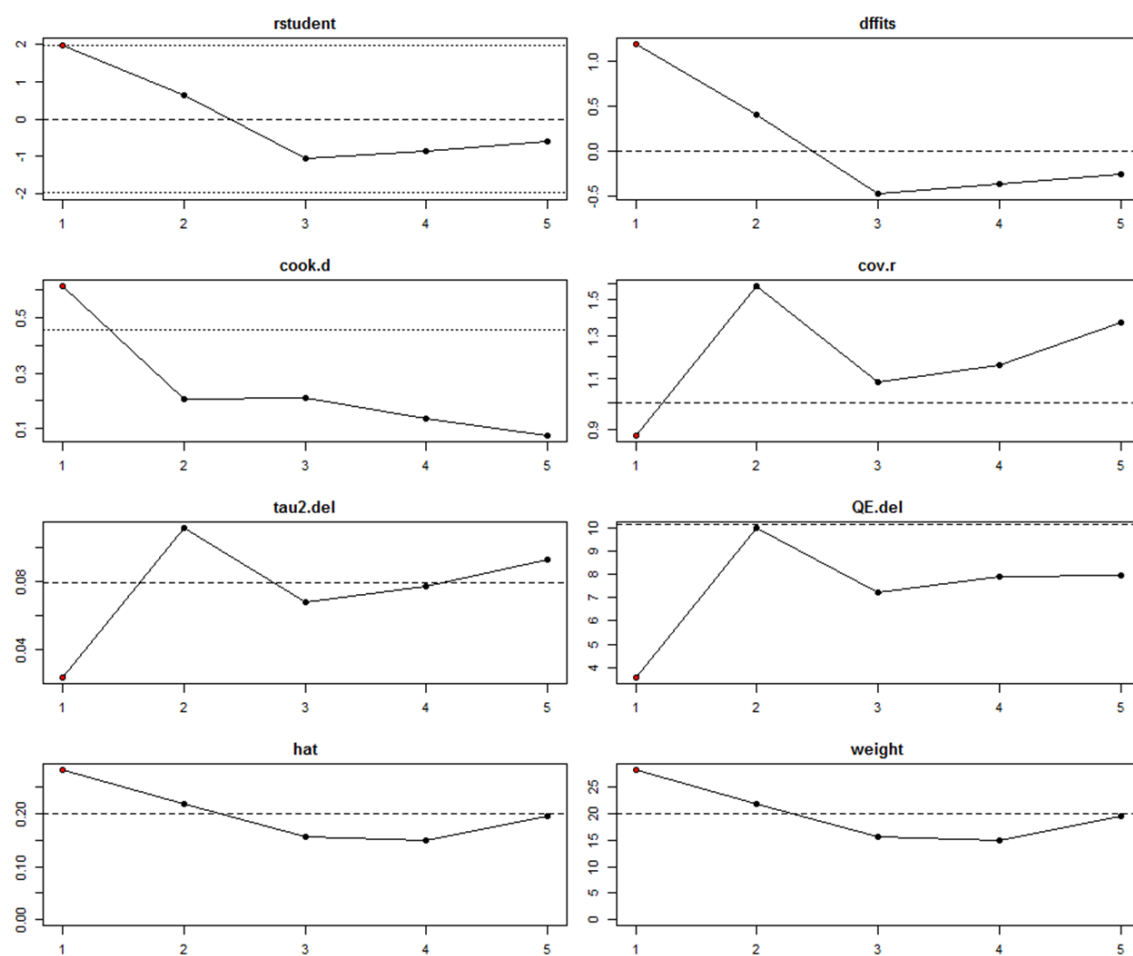
Supported Housing vs Floating Outreach Services – Wellbeing



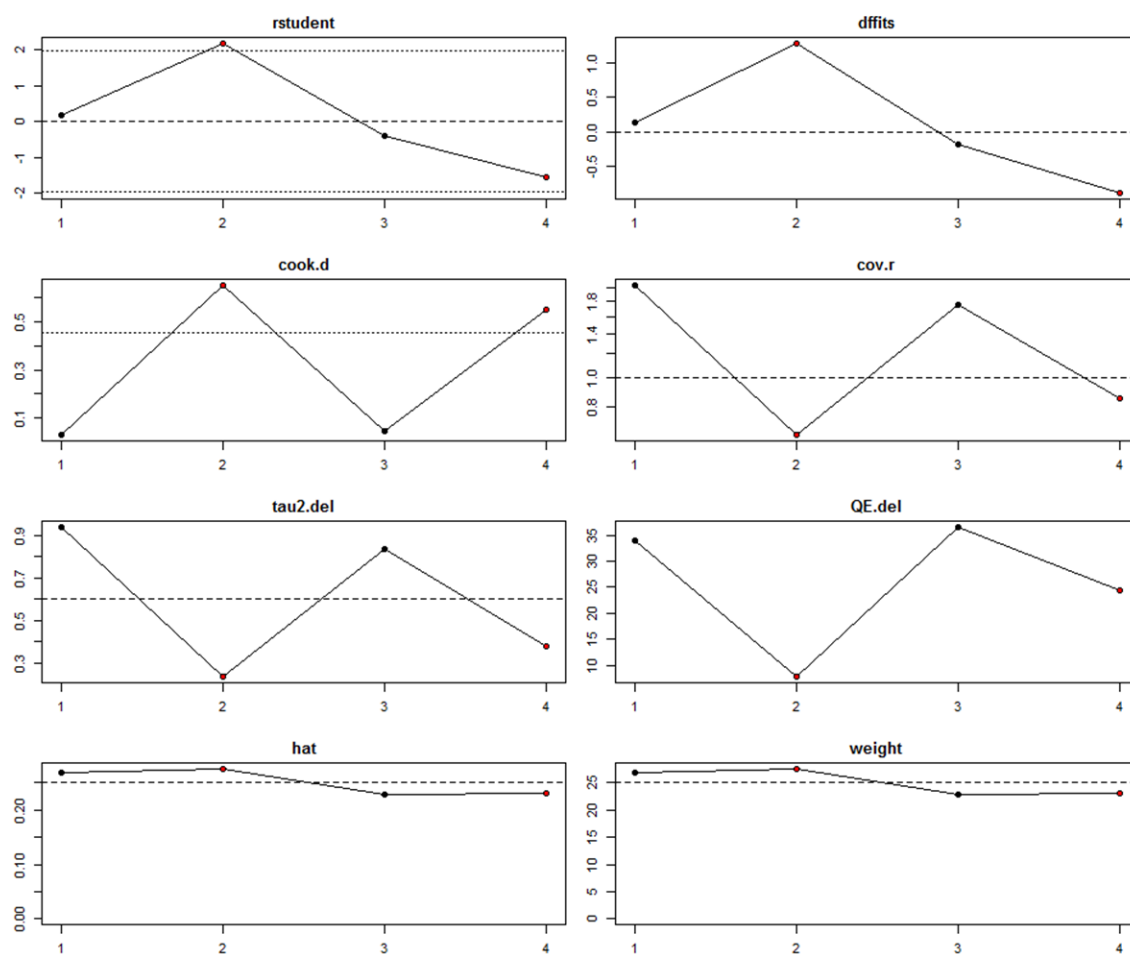
Supported Housing vs Floating Outreach Services – Living Conditions



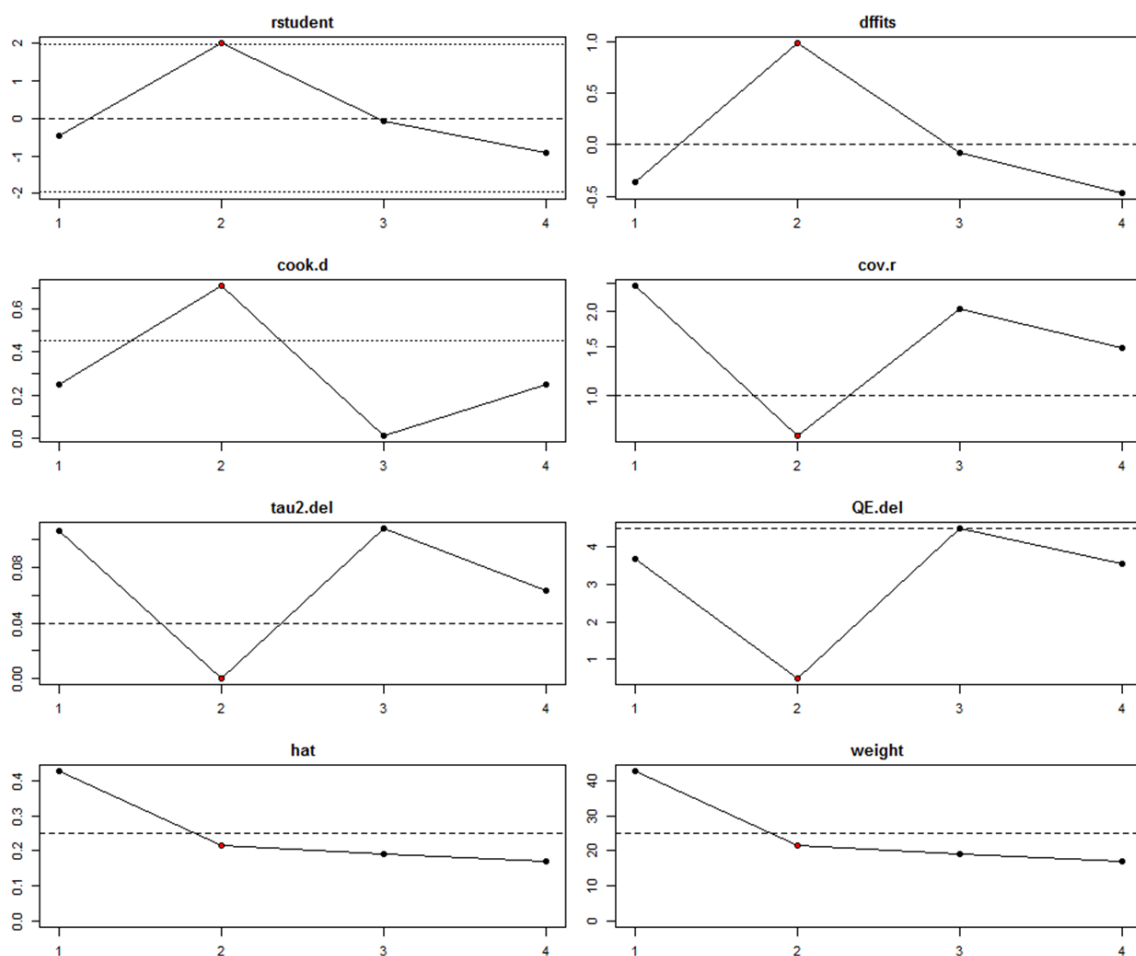
Supported Housing vs Floating Outreach Services – Social Functioning



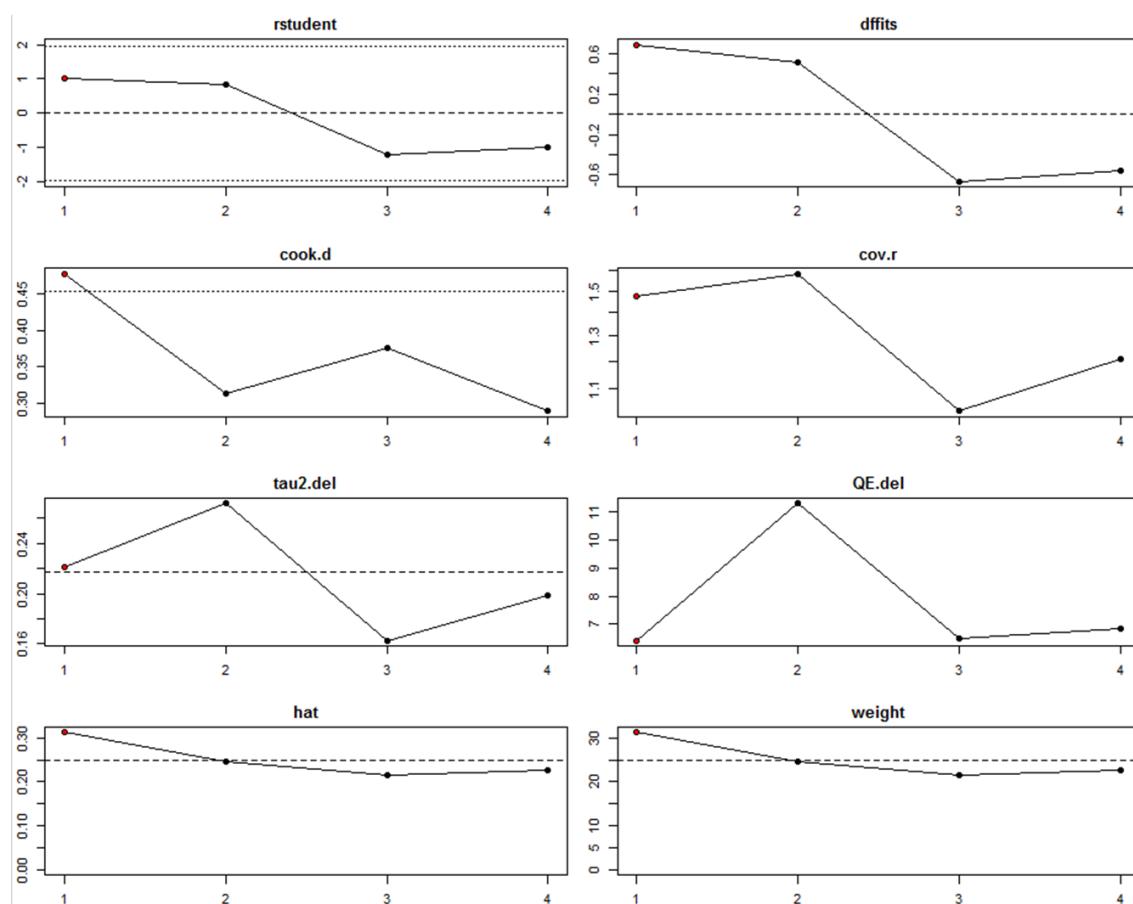
High Support vs Floating Outreach Services – Wellbeing



High Support vs Floating Outreach Services – Living Conditions



High Support vs Floating Outreach Services – Social Functioning



Appendix 6: Data codebook

SMRO4 category name	SMRO4 data dictionary	Variable name for analysis	Coding for analysis (if applicable)	Variable type
Admission_date	Most recent admission date subtracted from most recent discharge date to create length of stay in days	Length of Stay		Continuous
Discharge_date				
Age	Age calculated by National Records of Scotland indexing team prior to data being released to researcher	Age		Continuous
Discharge_Transfer_To	Combined codes from following categories matched to definition of high support to create variable: <ul style="list-style-type: none"> • Institution • Transfer within same Health Board/Health Care Provider • Transfer to other Health Board/Health Care Provider • Other type of location 	High support		Categorical
	Combined codes from category matched to definition of supported housing: <ul style="list-style-type: none"> • Private Residence 	Supported Housing		
	Combined codes from category matched to definition of floating outreach <ul style="list-style-type: none"> • Private Residence 	Floating Outreach		

SMRO4 code name	SMRO4 data dictionary	Variable name for analysis	Coding for analysis (if applicable)	Variable type
Main_Condition (Diagnosis at discharge)	ICD-10 codes			
	Combined codes from F20-29 Schizophrenia, schizotypal and delusional disorders to create variable	Schizophrenia		Categorical
	Combined codes from F30-39 Mood (affective disorders) to create variable	Mood Disorder		
	Combined codes from F60 -69 Disorders of adult personality and behaviour to create variable.	Personality Disorder		
Previous_Psychiatric_Care	1 Yes, readmitted following break in psychiatric care	Previous Psychiatric Care	Yes	Categorical
	2 Yes, direct transfer from or within a psychiatric hospital			
	3 No, first admission to any psychiatric hospital		No	
	9 Not known		9 not included in final analysis	
Sex (Gender)	1 Male	Gender	1 Male	Categorical
	2 Female		2 Female	
Status_on_Admission	3 Formal	Legal Status	3 Formal	Categorical
	4 Informal		4 Informal	

SGSCS code name	SGSCS data dictionary		Variable name for analysis	Coding for analysis (if applicable)	Variable type
Carer	01 or 1 Client is known to have a carer		Carer	1 Client known to have carer	Categorical
	02 or 2 Client is known to not have a carer			2 Client known not to have a carer	
	09 or 9 Not Known whether client has a carer			9 Not Known whether client has carer	
Financial contributor	Identifies who contributes financially to the total Care Package value		Financial contributor		
SDSContrib01 – Social Work	1 Yes 0 No		Contribution from social worker (only)	1 Yes 0 No	Categorical
SDSContrib02 – Housing	1 Yes 0 No	Combined to create one aggregated “Other” category	Contribution from other (only)	1 Yes 0 No	Categorical
SDSContrib03 - Independent Living	1 Yes 0 No				
SDSContrib04 - Health	1 Yes 0 No				
SDSContrib05 - Client	1 Yes 0 No				
SDSContrib06 - Other	1 Yes 0 No				
	Category created to indicate if individual had contribution from more than one source (Various combinations of codes SDSContrib01 - SDS Contrib06).		Contribution from multiple sources	1 Yes 0 No	Categorical
SDSContrib99 – Not known	1 Yes 0 No		Not included in final analysis	Not applicable	Not applicable

SGSCS code name	SGSCS data dictionary		Variable name for analysis	Coding for analysis (if applicable)	Variable type
Support mechanism	Identify what mechanisms of care delivery and support will be associated with the SDS Care Package.		Support mechanism		
SDSSupport02 – service provider Local Authority	1 Yes 0 No		Support provided by Local Authority	1 Yes 0 No	Categorical
SDSSupport03 – service provider Private	1 Yes 0 No		Support provided by Private provider	1 Yes 0 No	
SDSSupport04 – service provider Voluntary	1 Yes 0 No	Combined to create one aggregated “Other” category	Support provided by other provider	1 Yes 0 No	
SDSSupport05 – service provider other	1 Yes 0 No				
SDSSupport01 – Personal Assistant Contract	1 Yes 0 No				
SDSSupport99 – service provider not known	1 Yes 0 No		Not included in final analysis	Not applicable	Not applicable
Scottish Index of Multiple Deprivation (SIMD)	SIMD deciles assigned by National Records of Scotland indexing team from postcode data prior to data being released to researcher		Level of deprivation		
	Deciles 1 – 3 (Combined)		Living in most deprived area	Most	Categorical
	Deciles 4-6 (Combined)		Living in moderately deprived area	Moderate	
	Deciles 7-9 (Combined)		Living in least deprived area	Least	

SGSCS code name	SGSCS data dictionary	Variable name for analysis	Coding for analysis (if applicable)	Variable type
SDS Needs	What identified client care needs the SDS Care Package will meet.	Identified care need		
SDSNeeds01 Personal Care	Client has identified personal care needs	Personal Care	1 Yes 0 No	Categorical
SDSNeeds02 Health Care	Client has identified health care need	Health Care	1 Yes 0 No	
SDSNeeds03 Domestic Care	Client has identified domestic care need	Domestic Care	1 Yes 0 No	
SDSNeeds05 Social, Educational, Recreational	Client has identified social, educational, recreational need	Social, Educational, Recreational	1 Yes 0 No	

Appendix 7: QMU Ethics Letter



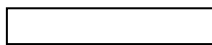
Queen Margaret University
EDINBURGH



Lucy Hinds
Research Ethics Panel Secretary
Governance and Quality Enhancement
Queen Margaret University
Queen Margaret University Drive
Musselburgh
EH21 6UU

Tel: 0131 474 0000
Email: researchethics@qmu.ac.uk

25 May 2017



Research title: Investigating the relationship between environmental factors, participation needs and hospitalisation for individuals with complex mental health needs.

I am writing in relation to the above named research to acknowledge receipt, on behalf of the Queen Margaret University Research Ethics Panel, of all relevant information, including the statement from the South East Scotland Research Ethics Committee that NHS ethical approval is not required. For our records, please provide us with a copy of the outcome from your submission to the Public Benefit and Privacy Pane and any additional external approvals that you receive.

I hope that this confirmation is helpful. Should you require any further information, please let me know.

Yours sincerely

Lucy Hinds
Secretary to the Research Ethics Panel

**DIVISION OF GOVERNANCE AND QUALITY ENHANCEMENT
QUEEN MARGARET UNIVERSITY, EDINBURGH
MUSSELBURGH
EAST LOTHIAN EH21 6UU
TELEPHONE: 0131 474 0000**

Appendix 8: PBPP approval for data linking

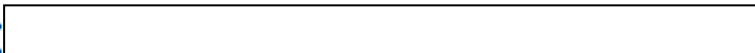
Miss Michele Harrison
Firefly Research Team
Queen Margaret University
Queen Margaret University Drive
EDINBURGH
EH21 6UU

Date: 13th November 2017
Your Ref:
Our Ref: 1617-0318

Dear Miss Harrison

Re: Application 1617-0318/Harrison: Investigating the relationships between environmental factors and participation on outcomes for individuals with complex mental health needs.
Version: V3

Further to your approval issued by the Public Benefit and Privacy Panel for Health and Social Care on 18th July 2017 I am writing to confirm that we accept the amendment(s) to the proposal notified on 10th November 2017. The changes accepted are as follows:

- 
-

Please note that any conditions attached to your original approval remain in place and you should continue to comply with those conditions outlined in the approval letter.

This approval is given to process data as specified in the approved application form, and is limited to this. Approval is valid for the period specified in your application. You are required to notify the Panel Manager of any proposed change to any aspect of your proposal, including purpose or method of processing, data or data variables being processed, study cohorts, individuals accessing and processing data, timescales, technology/infrastructure, or any other relevant change.

I would take this opportunity to remind you of the declaration you have made in your application form committing you to undertakings in respect of information governance, confidentiality and data protection. In particular you should be aware that once personal data (irrespective of de-identification or other controls applied) has been extracted from NHSS Board(s) and transferred to you, that you will then become the Data Controller as defined by the Data Protection Act (1998).

Yours Sincerely

Ashley Gray
Panel Manager
NHS Scotland Public Benefit and Privacy Panel for Health and Social Care
Email: nss.PBPP@nhs.net